DOCUMENT RESUME

ED 080 840 CE 000 053

AUTHOR	Hartman, Gerhard; Toerber, Garry A.
TITLE	Health Education, Health Manpower, and a System (Green Bay, Wisconsin).
PUB DATE	69
NOTE	175p.
EDRS PRICE	MF-$0.65 HC-$6.58
DESCRIPTORS	*Health Needs; *Health Personnel; Health Services; Manpower Needs; *Medical Research; Paramedical Occupations; *Research Projects; *Statewide Planning; Vocational Education
IDENTIFIERS	*Green Bay; Wisconsin

ABSTRACT

The purpose of this research study was to determine the need/demand totals and characteristics concerning health personnel for Green Bay and eastern Wisconsin; and to stimulate an effective, efficient approach to the problem of supplying and organizing such health personnel. A delineation of the population served by health personnel in the Green Bay area, statistical regression analysis for projecting health manpower requirements, and an inventory to determine the numbers of existing health personnel were carried out. These data, in conjunction with indices of future need/demand patterns, provided the basis for the projection of future health care personnel needs. Conclusions derived from this study were that health team and paramedical personnel training, together with integrated training institution curriculums and health complexes, must assume a greater role in the treatment and care of a patient. The major physician must conserve his professional abilities through his position as team leader. As future health care needs increase, priority should be given to continual recruitment of quality health personnel. Additional research, oriented toward the concept of an appropriate facility team mix, will be needed; and there must be consistency of job description and classification for health personnel. (KP)

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Health Education Health Manpower And A System

Gerhard Hartman, Ph. D.
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HEALTH EDUCATION, HEALTH MANPOWER, AND A SYSTEM

GREEN BAY, WISCONSIN

A Research Document

by

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and
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1969

PREFACE

The study of health manpower had traditionally entailed an investigation of provider population ratios. The inadequacy of this approach is finally becoming apparent. The impact of differing demand conditions, differing delivery systems, and differing manpower productivity has led to a realization that provider-population ratios can produce not only inaccurate data but inappropriate decisions.

This document offers a new approach to the study of health manpower. The characteristic factors of need and demand are inspected. A health care delivery system is proposed, and health manpower educational systems examined. Furthermore, although the document does provide specific health manpower projections methodologies, it does consider the unpredictable impact which the proposed health care delivery system would have on health manpower needs.

While the concern of the study is Green Bay and eastern Wisconsin, the concepts developed certainly have direct relevance to other locales. Need/demand relationships, health systems, and prediction methodologies are applicable to health care officials of any region who are truly concerned with health care in general, and the needs of their communities in particular.

The authors wish to express their sincere gratitude to Daniel R. Smith, Administrator of Bellin Memorial Hospital for his critical review and helpful suggestions, and to members of the Brown County Comprehensive Planning Council. Special recognition should also be extended to members of the 1968 Masters and Doctoral classes of the Graduate Program in Hospital and Health Administration who willingly contributed their time to the collection and interpretation of various data.

Finally to the Board of Trustees of Bellin Memorial Hospital, Green Bay, Wisconsin, we owe a special debt of gratitude for their financial support of the publication of this document. The Board of Trustees willingly chose to make available a study of the needs of their hospital and the surrounding region to concerned health care administrators and officials everywhere.

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PREFACE

Although developed primarily as a report of research on health services and needs of one region, "Health Education, Health Manpower, and a System" is, in fact, a comprehensive planning document for area application. Members of the University of Wisconsin - - Green Bay were fortunate in having opportunity to examine and comment upon the document during its preparation for publication; this opportunity has been of benefit to the University in developing its programs and plans.

Of particular interest is the concept of a "Health Camplex" described by the authors - the total integration of educational and health care processes interrelated with appropriate educational institutions of the region. Guidelines are provided for a model cooperative system of health facilities and community universities. This is particularly pertinent for the University of Wisconsin - - Green Bay with its "communiversity" concept and its off-campus, community-related, work-study programs for students. Many examples of this cooperative approach are evident now; increased cooperative study and manpower usage are anticipated.

Finally, this report provides valuable information and demographic projections for the Green Bay area - - data which is difficult to obtain without extensive research. Estimates of regional population growth, age distribution and economics are pertinent to a number of planning endeavors in addition to the provision of health services.

The authors and the Board of Trustees of Bellin Memorial Hospital are to be complimented on the preparation and publication of this comprehensive and most valuable document.

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CHAPTER I

PURPOSE AND SCOPE

INTRODUCTION

"This nation has a chronic health problem: the chronic shortage of health personnel in all categories. The size of the shortage can only be estimated because the problem is compounded by (1) uneven distribution, (2) less than maximum utilization,"[1] and (3) less than optimal organization of health manpower resources. This statement both identifies the problem and suggests a partial solution. In fact, the extent to which the three factors are responsible for the supposed chronic health manpower shortages remains a most important question. The answer would represent a significant contribution to current health manpower literature.

Regardless of the extent of existing shortages, the problem will be compounded in the future by a predicted increase in demand for health care. Increased demand for health care and a concomitant increased demand for health manpower will result from a number of factors: (1) an ever increasing population, (2) an increase in public knowledge and an awareness of the need and potential of health services, (3) the changing modes in financing the costs of health care that have created an effective demand for health services by the public, and (4) the constant innovations and technological advances in the social, medical, and communicative services that have increased the need for new and better-trained personnel in the health care area.

Since the above factors are in general quite desirable developments, the problem can not be solved by combating the specific causes identified. Rather, it will be necessary to accept the fact of increased demand and thus implement a more effective mechanism for the provision and utilization of necessary health manpower.

Hence, the purpose of this study will be: (1) the determination of the need/demand characteristics and totals for a specified area; Green Bay and eastern Wisconsin, and (2) the stimulation of an effective and efficient approach to the problem of supplying and organizing the necessary health personnel.

METHODOLOGY

The methodology to be utilized in this study will include the delineation of the population served by health personnel in the Green Bay and eastern Wisconsin region. An inventory will then be undertaken to determine the existing personnel in the geographically delineated region. These data in conjunction with indices of future need/demand patterns will provide the basis for a projection of the need for the various types of health personnel.

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[1] National Commission on Community Health Services, *Health Is a Community Affair* (Cambridge, Massachusetts: Harvard University Press, 1966), P.79.

Finally, this study will recommend a means of supplying the projected health personnel requirements. The methods specified will be cognizant of both present and futuristic concepts of comprehensive health care. Additionally, the recommendations will of necessity indicate the role of area health and educational facilities. Special emphasis will be placed upon their integration to provide maximum future effectiveness in provision of health services.

This study will be of little benefit if it does not stimulate an orderly and systematic implementation of the recommendations it contains. Implementation will be the most difficult but surely the most important step in a series of steps designed to provide the residents of Green Bay and eastern Wisconsin with quality patient care in the most efficient and effective manner possible within the constraints of the available social, demographic and economic resources.

SECTION I

EVOLUTION OF HEALTH MANPOWER AND HEALTH SYSTEMS

A study of health manpower would logically begin with an investigation of its evolution. An indication of both past trends and the resultant current categories of health personnel is essential; especially if an understanding of past, present, and future methods of dispensing health care services is to be expected. For in reality, the type of health personnel available will determine to a great extent the types of health care delivery systems feasible.

Accordingly, Chapter II will discuss the evolution of health manpower since World War II. Special emphasis will be directed toward the influence of science and technology and its impact on the need for specialization in the health sciences. Specialization that has, in turn, led to the need for additional categories of health personnel.

Chapter III will then explore past, present, and future health care delivery systems. Three past and/or present systems will be identified. The problems inherent in these systems will provide the basis for a suggestion of the need for a new system; one that will focus primarily upon the objective of the complete integration of all elements of health care.

CHAPTER II

THE EVOLUTION OF HEALTH MANPOWER

INTRODUCTION

Since the end of World War II, the basic concept of health manpower has undergone a period of dynamic evolution. An analysis of this evolution must begin with mention of the two key economic variables which have affected such changes – supply and demand. During the last twenty-year period, the demand for health services has increased at an astonishing rate. For example, during the fifteen year period 1950-65, expenditures for health services and supplies have more than tripled, increasing from $11,900 million to $37,300 million.[1]

While a large percentage of the increased demand was due to the ever growing population, a significant portion can be attributed to the advancements in scientific techniques or procedures which has led to "high quality patient care."[2] High quality care has, in turn, demanded and utilized ever increasing health care resources – manpower, money, and material. In addition, the growing affluence of many Americans as well as the growth of insurance activities in the health sphere have brought about an increase in funds available for health care purchases.

The second variable, supply, has also undergone substantial changes. During the same period of "demand explosion," the "number of workers in the health occupations increased by over 90 percent."[3] Of this increase a large proportion of the health care workers were employed in health occupations which were nonexistent before World War II.

In the remainder of this chapter a systematic analysis will be undertaken of two of the primary conditions that have affected the identified changes in the supply and demand for health services: (1) science and technology, and (2) paramedical personnel.

INFLUENCE OF SCIENCE AND TECHNOLOGY

Since World War II medical research has produced changes of such magnitude that the future capabilities of health care now seem unlimited. In a relatively short period of time it has become quite common to read about open heart surgery, kidney transplants and even heart transplants. Much of the impetus for procedures of this type has come from an increase in expenditures for medical research. For example, in 1947 the total expenditure for medical research was $87 million. Less than 20 years later, expenditures had increased to $2 billion.[4]

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[1] Ward Darley and Anne R. Somers, "Medicine, Money and Manpower--The Challenge to Professional Education, I. The Affluent New Health-Care Economy," *New England Journal of Medicine,* CCLXXVI (June, 1967), 1234.

[2] U. S. Department of Health, Education, and Welfare, *Health Manpower Perspectives 1967,* Public Health Service Publication No. 1667 (Washington, D. C.: U. S. Government Printing Office, 1967), p. 3.

[3] *Ibid.*

Concurrent with the increase of medical research has come a trend toward specialization. The demand for specific and complex procedures by the patient community has compelled many graduating medical students to continue their studies in specialty areas. For instance, during the period between 1950 and 1963 the percentage of medical students specializing increased from 35 to 65 percent.[5]

A direct result of the increase in medical research and specialization is the need for additional types of health personnel. It is no longer appropriate to view the health team in the traditional terms of the doctor and his nurse. Recently, observers of the health community here witnessed the use of many other highly qualified personnel. Sometimes termed allied health personnel, other times paramedical personnel, new health occupations such as radiologic technicians, medical technologists, and physical therapists have joined the traditional practitioners of health care in disseminating patient care services. One vivid example of this new approach appears at Mt. Zion Hospital in San Francisco. It is reported that a team experimenting with surgery for cerebral palsy includes a "biophysicist, an engineer, two neurosurgeons, a neurophysiologist, a speech pathologist, and a psychiatrist." [6]

Table 2-1 provides data concerning the distribution of health personnel among selected health occupations for 1950 and 1960. In addition, it provides a projection for the same occupations for 1970. As indicated in the table, the traditional elements of medical practice- -physicians, nurses and dentists--have increased their absolute numbers. However, during the same time period their relative percentages within the total occupational categories decreased. Medical doctors and osteopaths decreased from 13 to 10 percent, dentists from 5 to 4 percent, and registered nurses from 30 to 29 percent. Totals projected for 1970 indicate that a further proportionate reduction may be expected.

The reason for the observed proportionate decline in the traditional elements of health manpower is, of course, the entrance and expansion of other health occupational categories. Table 2-1 indicates the

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[4] Darley and Somers, *loc. cit.*

[5] U. S. Department of Health, Education, and Welfare, *op. cit.*, p.4.

[6] Herman M. Somers and Anne R. Somers, *Doctors, Patients, and Health Insurance* (Washington, D. C.: The Brookings Institution, 1961), p. 46.

TABLE 2-1

EMPLOYMENT, EMPLOYMENT GROWTH AND DISTRIBUTION OF MANPOWER IN SELECTED HEALTH OCCUPATIONS, 1950, 1960 AND PROJECTIONS TO 1970[a]

Occupation	1950 Total	Percentage of Total	1960 Total	Percentage of Total	Percent Change 1950-1960	1970 Projected Employment	Percentage of Total	Percent Change 1960-1970
MD's & Osteopaths (excl. Psychiatrists)	178,709	13.48	222,567	10.93	+ 24.5	298,573	8.14	+ 34.0
Psychiatrists & Neurologists	5,341	.40	11,185	.56	+109.5	28,342	.78	+153.5
Dentists . . .	68,670	5.18	86,887	4.35	+ 26.5	119,191	3.25	+ 37.0
Veterinarians	11,370	.86	15,205	.76	+ 33.5	22,396	.61	+ 47.0
Pharmacists .	84,480	6.37	92,233	4.61	+ 9.0	104,094	2.84	+ 12.5
Clinical Psychologists	1,808	.14	5,888	.29	+225.5	24,521	.67	+316.5
Life Scientists Health .	6,090	.46	13,208	.66	+117.0	34,829	.95	+163.5
Biophysicists	232	.02	962	.05	+314.5	6,167	.17	+541.0

[a]Source: Irene Butter, "Health Manpower Research: A Survey," Inquiry, IV, No. 4 (December, 1967), 6-7.

TABLE 2-1--Continued

Occupation	1950 Total	Percentage of Total	1960 Total	Percentage of Total	Percent Change 1950-1960	1970 Projected Employment	Percentage of Total	Percent Change 1960-1970
Biochemists .	4,116	.31	5,625	.28	+ 36.5	8,516	.23	+ 51.5
Podiatrists .	7,100	.54	7,600	.38	+ 7.0	8,350	.23	+ 10.0
Optometrists .	14,880	1.12	16,205	.81	+ 9.0	18,227	.50	+ 12.5
Audiologists & Speech Pathologists .	1,500	.11	6,200	.31	+313.0	33,441	.91	+439.5
Environmental Health Engineers . .	4,000	.30	5,226	.26	+ 30.5	7,466	.20	+ 43.0
Public Health Educators . .	650	.05	1,000	.05	+ 54.0	1,754	.05	+ 75.0
Hospital Administrators	8,600	.65	12,000	.60	+ 39.5	18,651	.51	+ 55.5
Psychiatric Social Workers	5,000	.23	7,189	.36	+139.5	21,265	.58	+195.0
Medical Social Workers . . .	3,153	.24	4,467	.22	+ 41.5	7,077	.19	+ 58.5
Vocational Rehabilitation Counselors . .	1,500	.11	3,000	.15	+100.0	7,206	.20	+140.0

TABLE 2-1--Continued

Occupation	1950 Total	Percentage of Total	1960 Total	Percentage of Total	Percent Change 1950-1960	1970 Projected Employment	Percentage of Total	Percent Change 1960-1970
Medical Record Librarians . .	4,300	.32	8,000	.40	+ 86.0	17,652	.48	+120.5
Dietitians, etc.	21,960	1.66	26,470	1.32	+ 20.5	34,090	.93	+ 29.0
Medical Technologists	26,495	2.00	53,720	2.69	+103.0	131,087	3.58	+144.0
RN's	403,470	30.42	581,289	29.08	+ 44.5	940,537	25.66	+ 62.0
PN's	134,010	10.11	207,956	10.40	+ 55.0	368,765	10.06	+ 77.0
Chiropractors	12,420	.94	13,853	.69	+ 11.5	16,091	.44	+ 16.0
Sanitarians .	5,000	.38	11,000	.55	+120.0	29,502	.80	+168.0
Physical Therapists . .	4,600	.35	9,000	.45	+ 95.5	21,069	.57	+134.0
Occupational Therapists . .	2,000	.15	8,000	.40	+300.0	47,212	1.29	+490.0
Other Therapists . .	8,200	.62	5,768	.29	- 30.0	2,710	.07	- 53.0
Dental Hygienists . .	6,192	.47	9,855	.49	+ 59.0	18,152	.50	+ 84.0
Dental Lab Technicians .	18,500	1.40	19,711	.99	+ 6.5	21,516	.59	+ 9.0

TABLE 2-1--Continued

Occupation	1950 Total	Percentage of Total	1960 Total	Percentage of Total	Percent Change 1950-1960	1970 Projected Employment	Percentage of Total	Percent Change 1960-1970
Dental Assistants . .	18,561	1.40	36,662	1.83	+ 97.5	86,800	2.37	+137.0
Opticians & Opitcal Technicians .	19,230	1.45	20,406	1.02	+ 6.0	22,152	.60	+ 8.5
Radiologic Technicians .	27,201	2.05	55,386	2.77	+103.5	135,861	3.71	+145.0
Medical Record Technicians .	8,000	.60	23,000	1.15	+187.5	83,469	2.28	+263.0
Nurse Aides, Orderlies & Attendants . .	199,440	15.04	391,136	19.57	+ 96.0	918,191	25.05	+135.0
Midwives . . .	1,343	.10	896	.04	- 33.0	474	.01	- 47.0
TOTAL	1,326,121	100.03	1,998,765	99.96	+ 50.5	3,665,398	100.02	+ 83.5
Labor Force	63,099,000		70,306,000		+ 11.4	85,999,000		+ 22.3
Population	151,325,798		179,323,175		+ 18.5	207,326,000		+ 15.6

rapid growth rate of such allied health personnel as psychiatrists, clinical psychologists, biophysicists, speech pathologists, and occupational therapists. In each instance their increase exceeded 100 percent during the 1950-1960 year period. The projections offered by the table further indicate that this trend will continue until at least 1970. Thus, continued emphasis upon paramedical personnel development seems to be in the offing.

INFLUENCE OF THE DEVELOPMENT OF PARAMEDICAL PERSONNEL

Perhaps the most significant result of the development of paramedical personnel has been the emergence of a new philosophy concerning patient care. Due primarily to the decrease of physicians and nurses, and the increase of allied health personnel in conjunction with an increased emphasis on treating the total needs of the patient, the new philosophy concentrates on a coordinated team approach. Such an approach relieves some of the burden traditionally falling upon physicians and nurses, and thus makes possible the implementation of the new concept of both "curing" and "caring" for the patient. In this regard, each of the members is interdependent upon each other. Emphasis is placed upon synthesizing individual efforts in an attempt to promote comprehensive patient care.

According to the report of the National Commission on Community Health Services the team concept is a necessary condition for total patient recovery. As they state:

> Among the primary issues is that of not losing sight of the total patient--or, for that matter, the entire community. The paramount need is for physicians and other members of the personal health care team to be especially trained to deal with the whole patient in his social and environmental context. It is important that they understand the particular skills and contributions of each of the allied health professions and supporting personnel and know how to collaborate constructively with them. Their combined efforts must be integrated around the patient to meet his social and emotional as well as physical needs.[7]

Figure 2-1 represents a schematic diagram of the basic concept of the team approach. The outer circle indicates the total patient; each of the inner circles represent the individual members of the team; and the arrows refer to the constant communication necessary in the team approach to patient care.

A second major ramification of the development of the paramedical personnel is the changing role of the traditional practitioners of medicine. Originally, physicians were the sole supply of medical treatment to the community. Decisions concerning the patient's health

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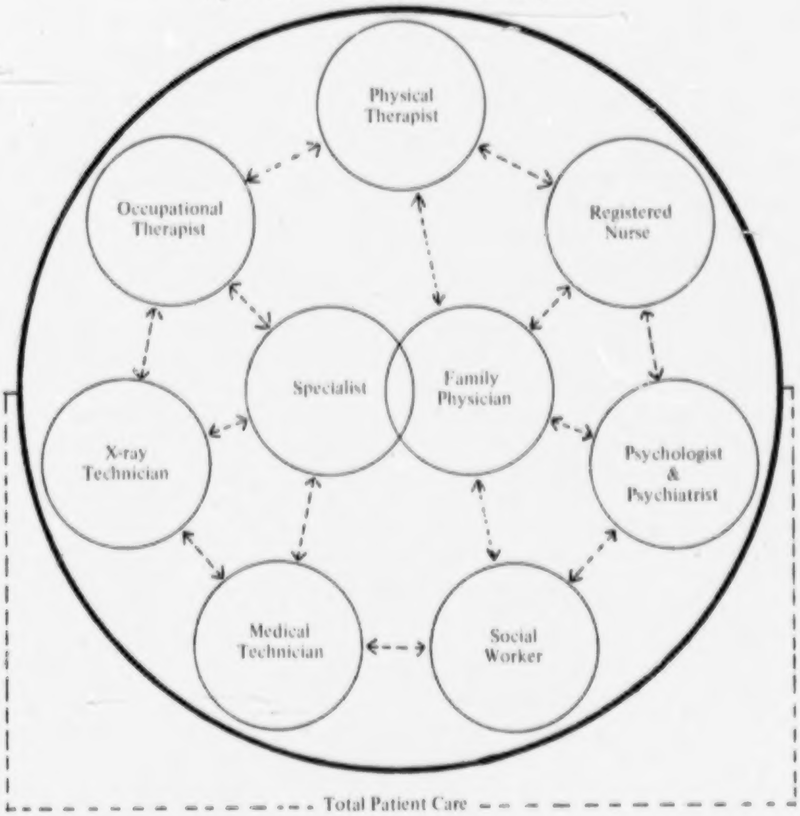
[7] National Commission on Community Health Services, *op. cit.*, pp. 78-79.

Fig. 2-1--Conceptual Diagram of Team Approach


Physical Therapist
Occupational Therapist
Registered Nurse
Specialist
Family Physician
X-ray Technician
Psychologist & Psychiatrist
Medical Technician
Social Worker
Total Patient Care

were his and his alone. The availability of sources of specialized knowledge were almost nonexistent. However, with an increase in the number and complexity of technical procedures and the explosion of medical research, the physician can no longer profess to be knowledgable in all areas of medical practice. It, thus, becomes more apparent with each passing year that the physician will have to rely upon the specialized medical expertise of allied health personnel in the treatment of his patients. As Dr. Lowell T. Coggeshall has stated in a recent report:

> It should be recognized that the physician can no longer master all areas of the basic biomedical sciences--he cannot even be acquainted with all of them. Nor can he be competent in all technologies associated with his own specialty. The ability to use technical assistance and to work cooperatively in a team should be

the essence of professionalism.[8]

The effectiveness of such an approach must now await additional empirical evidence. Whether the physician will attempt to retain his "authoritative position in medicine," or whether he will yield to other professions who now possess "knowledge and skills which physicians, at least in any clinically useable way, do not have," remains the question to be answered.[9]

Finally, at the present time educators throughout the nation are attempting a reappraisal of their curriculums in order to establish a greater social awareness on the part of the medical student.

One such study has even outlined a program which would integrate courses between the field of medicine and the fields of the behavior sciences. Specifically, the report suggests that primary physicians be "trained in psychiatry, internal medicine, pediatrics, preventive medicine, and the applicable aspects of the behavior sciences."[10] In this way the attitudes of the newly emerging physician will be more favorably disposed toward the acceptance of the team concept. If the patient is to receive optimum care such an attitude must exist. For as Figure 2-1 suggests, the physician is the hub around which the other members interact. If the hub is lost or if the communications among members of the team are restricted, the concept of comprehensive patient care is lost.

SUMMARY

It has been the purpose of this chapter to discuss the interaction of certain variables which have led to the rise of paramedical personnel. In so doing it was noted that the demands made upon the medical profession through scientific advancements have led to the development of paramedical or allied health personnel. In this regard it was observed that since World War II the proportion of physicians, nurses, and dentists has decreased while the proportion of the new health occupations such as x-ray technology and occupational therapy have increased.

In the second section, it was further noted that the development of paramedical personnel contributed to a new concept in the practice of medicine. Instead of a single professional caring for the patient, a team of experts has emerged which could and should provide comprehensive patient care. In closing, it should be noted that a change of attitudes among physicians and medical educators must occur before the team approach can become the truly effective comprehensive health care device which many knowledgable experts have predicted.

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[8] Ward Darley and R. Somers, "Medicine, Money and Manpower–The Challenge to Professional Education, II. Opportunity for New Excellence," *New England Journal of Medicine*, CCLXXVI (June 8, 1967), 1292.

[9] Richard M. Magraw, *Ferment in Medicine* (Philadelphia: W. B. Saunders Company, 1966), p. 172.

[10] Darley and Somers, *loc. cit.*, p. 1293.

CHAPTER III

HEALTH MANPOWER AND THE HEALTH DELIVERY SYSTEM

INTRODUCTION

The evolution of health manpower encompassing the increase in the degree of health care specialization has enabled the available medical manpower to more adequately serve the population. Yet, even though the "number of physicians, hospital beds, and health services per person is generally equal to or greater than they were 30 years ago,"[1] there continues to be talk of a "health crisis" in this country.

This talk of a health crisis is not idle speculation. The National Advisory Commission on Health Manpower identifies a number of indications that a health crisis actually exists:

> Long delays to see a physician for routine care; lengthy periods spent in the well-named "waiting room," and then hurried and sometimes impersonal attention in a limited appointment time; difficulty in obtaining care on nights and weekends, except through hospital emergency rooms; unavailability of beds in one hospital while some beds are empty in another; reduction of hospital services because of a lack of nurses; needless duplication of certain sophisticated services in the same community; [and] uneven distribution of care.[2]

This quote provides strong support for the conclusion that the crisis is quite real. However, an answer to the crisis is evident from a close analysis of the quote. The right resources are not available at the right time in the right place. Our real need is for a better "health care delivery system."

PRESENT "SYSTEM" - - SEGMENTED

The term "system" does not adequately describe the present disjointed use of medical manpower. Nonetheless to maintain continuity in the discussion, this study will refer to present as well as past methods of dispensing health care as systems.

An analysis of past systems would seem to represent the most logical point of departure for a discussion of future health care delivery systems. It should be noted, however, that it will be impossible to identify a specific time period during which any specific health system was in use. During any one specific period of time, the systems used in different parts of the country have represented quite different stages in the evolution and development of health care delivery systems. However, within the context of this constraint, it is still quite possible to identify the development and use of three systems in the United States.

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[1] Commission on Health Manpower, *Report of the National Advisory Commission on Health Manpower I* (Washington: U. S. Government Printing Office, November, 1967), P. I.

[2] *Ibid.*, P. 12

HOME BASED DELIVERY SYSTEM

The first health care delivery system centered around the home. The primary source of medical care was the family unit. The physician if utilized was generally called to the patients' home, and rendered "medical aid" as the state of the medical profession allowed. This system, of course, represented a highly inefficient use of the physician's time. However, the use of the time and efforts of the "strong family units" represented an additional and quite valuable source of health manpower. It is indeed regretable that this source of health manpower is not as readily available today.

PHYSICIAN'S OFFICE BASED DELIVERY SYSTEM

The next step and second identifiable stage in the evolution of health care delivery systems involved the use of the "doctor's office" as the focal point of health care. This represented a substantially more efficient use of the physician's time. The physician was not required to spend thirty minutes in travel for a fifteen minute "call." Consequently, he could treat a multiple of patients for each one treated in the home. Additionally, in many cases, the physician's office represented a more effective base of treatment. The static base of the physician enabled him to offer the patient more sophisticated diagnostic and therapeutic techniques, procedures, and equipment.

Another development during this stage, one which also led to generally better medical care, was the practice of referrals. The original physician of contact (primary physician) increasingly began to refer his more difficult and involved cases to other physicians or more significantly the hospital. This system, referred to by Edwin Crosby as the traditional pattern of medical care,[3] is probably still the most visible system to the general public.

HOSPITAL BASED DELIVERY SYSTEM

The introduction of the hospital as a major element in the provision of health care set the stage for the development of a new delivery system. That system consists of a "hospital based health care delivery system." The factor which perhaps most identifies the hospital based delivery system was (is) the development of ambulatory services in the hospital. This type of service incorporates both the emergency department and the "more traditional outpatient services."[4] This development enabled the hospital to both serve an increased number of patients and treat in the hospital patients residing at home who would have otherwise obtained services in their home or at a physician's office.

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[3] Edwin L. Crosby, "Improving the Delivery of Health Care Services," *Hospitals, JAHA,* XLI (September 1, 1967), 55.

The identified third stage has also increased the efficiency and effectiveness of the physician. The resources of the hospital have become increasingly at the disposal of the physician. These resources include personnel, equipment, and most importantly knowledge. Personnel refers specifically to nursing and the various classifications of paramedical personnel. Equipment includes the frequently expensive diagnostic and therapeutic equipment which only a hospital can realistically provide. Knowledge refers to the techniques and procedures developed primarily by researchers in large medical complexes and which frequently require the use and facilities of a progressive hospital to implement.

It should be emphasized again that it is inaccurate to use the term "system" in reference to any type of health care organization described to date in this chapter. It is probably more accurate to describe the system even as it exists today as a collection of "multiple, inadequately coordinated subsystems, some of which are totally independent of each other."[5]

One additional facet of each system should be recognized. That is simply that in reality the base of each is also the original point of entry for the patient. That is, the point of entry has successively been the patient's home, the physician's office, and finally the hospital. While the hospital should not be faulted as the current point of entry, fault should be placed on the lack of easy access to other elements in the present health care delivery system.

FUTURE SYSTEM - - INTEGRATED

Accordingly it is believed that the organization of health care should enter a fourth stage. A system that is not based on any one element within the system. One that provides the individual with a choice of entry, but with easy access to all other elements in the system. Admittedly, certain entry points will continue to be most utilized, but the essential distinction is the individual will not need to possess the knowledge of the correct institution for his needs to have immediate access to it. This criterion becomes particularly essential in view of the increase in specialization and the concurrent diffusion of the sources of supply for health care. The increasing complexity of the system has

[4] *Ibid.*

[5] Commission on Health Manpower, *op. cit.*, p. 33.

unfortunately been matched by a corresponding increase in the bewilderment of the individual seeking health services; thus the need for a more simplified system in the context of the consumer.

Another result of the proposed integrated system could be the elimination of needless and frequently expensive duplication of facilities. There is no logical reason for a continuation of the present competitive practices which have been primarily responsible for needless duplication. A cooperative arrangement through an integrated system of referral patterns would eliminate the need for useless duplication by providing any patient at any institution immediate access to techniques and/or equipment available at other health institutions.

Equally as important as the recognition of the frequent needless duplication of facilities, is the recognition that decisions as to the actual investment of a community's resources in health care facilities and manpower must remain with the community itself. The independent decision-making process of each community must be protected. However, it is highly likely that a more efficient use of resources will occur when referral patterns are established which allow quality patient care for all without requiring that each community invest in all the health care facilities which it might medically need.

It should be noted before the proposed system is described that it is not meant to be viewed as the panacea for all sections of the country or even for Green Bay and eastern Wisconsin. It is, however, meant to provide "a system" which could serve the citizens of the delineated region far better than past systems.

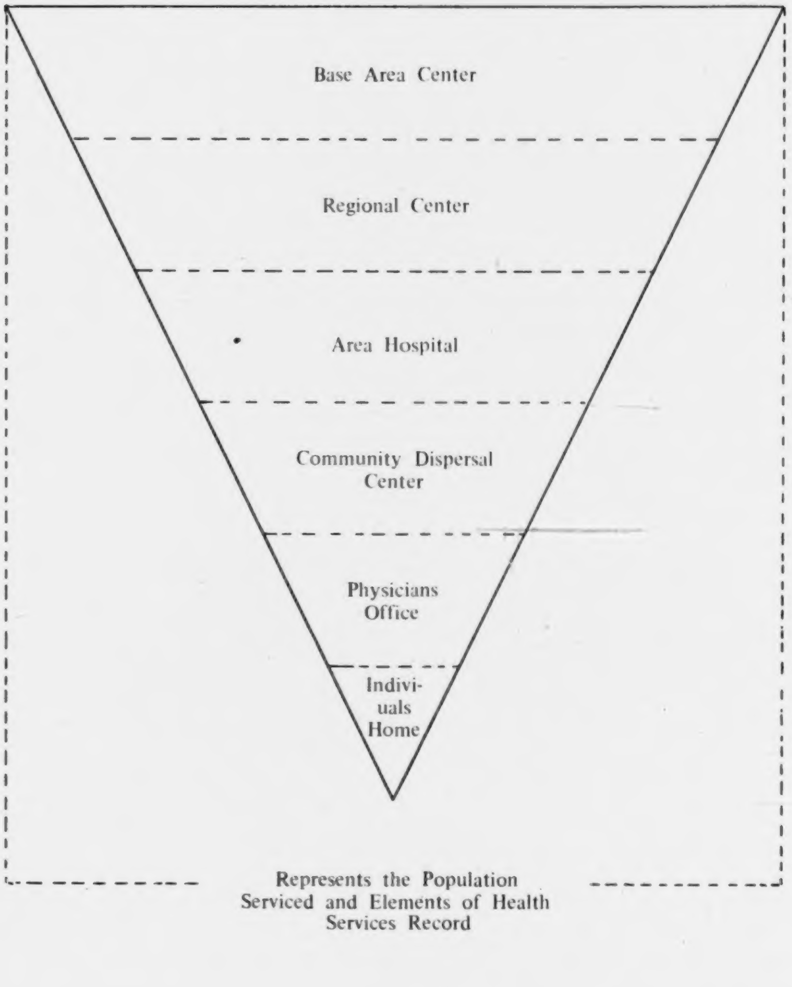
A SUGGESTED INTEGRATED SYSTEM

The system as devised will have as its primary focus, the realization that each community need not possess all elements of health care which its population might medically utilize. The important factor being that the community have immediate access to all health care elements. Consequently, an effective system might schematically closely resemble an inverted pyramid of the elements of health care. (See Figure 3-1). The inverted base (designated a base area center) would contain the largest collection of manpower, equipment, and facilities. The center would, however, not only provide its services to the population within the immediate area, but to the entire region which it can serve as the focus of an integrated system.

Directly below the base area center is the regional center. It would provide services to its service area; that is, that reduced population base which could be served by the extension of its services through integrated referral patterns. This institution could then provide reduced numbers of services yet the population in its immediate service area could still avail themselves of all services provided by any resource in the total system.

Below the regional center is the area hospital and then the com-

Fig. 3-1. - - Modular concept of integrated health system


Base Area Center
Regional Center
Area Hospital
Community Dispersal Center
Physicians Office
Indivi-uals Home
Represents the Population Serviced and Elements of Health Services Record

munity dispersal center. The area hospital differs from the regional center only in the size of the population served, the number, and complexity of the services it **must** offer. It is contemplated that it would closely resemble the community hospital which has become quite common in rural sections of the United States.

Since a new concept, the community dispersal center, has been identified, it would be beneficial to identify certain distinguishable features of the center as well as the functions it might provide. First, the center could be manned by sub-physician personnel (sub-physician here refers to all types of health manpower who have less than M. D. certification). The well documented problems inherent in recruiting physicians into rural communities will probably make it necessary to staff the center with the sub-physician. Public health nurses and technicians in the rapidly developing and expanding paramedical personnel arena would logically qualify.

Services which the center could logically provide would include the provision of both preventive care and first aid. It is evident preventive techniques have not received the emphasis they deserve. Accordingly, a dispersal center could provide for the rural community a major impetus toward a more effective utilization of present and future preventive techniques and procedures. Secondly, since the effective administration of first aid procedures is dependent upon its close proximity to the consumer, this function would logically fall within the domain of the community dispersal center.

In the future, as additional diagnostic tests are provided by automated equipment (witness the multiphasic tests developed and used at the Kaiser Foundation Hospitals), a third potential function becomes apparent. Since the automated equipment is not dependent upon physicians but upon technicians, these centers could logically provide diagnostic tests for the consumer.

Communication is another function. The information obtained from the diagnostic procedures would be electronically dispatched to hospital centers for interpretation. The results would be returned to the area dispersal center. These results form the basis for a fifth function; dispersal of required medication.

Concurrent with the development of the communications network should be the implementation of a transportation network. The center could provide the coordination for a transportation system between the consumer in his local community and the various institutions within the integrated system.

Finally, the center could provide an excellent opportunity for the performance of certain administrative functions. The collection and storage of health care data would prove quite useful. Instant reproduction through electronic copying devices would enable records stored at the center to be used by all other units in the system.

The remaining elements in the pyramid represent traditional elements of health care. Thus, an elaborate identification of their specific functions is not necessary. It should be sufficient to note that a reduction in the number of elements of health care provided and the population served would continue until the point of the pyramid is reached; the consumer's home.

It may seem quite obvious but special mention should be made of the necessity to allow direct access from any level of the system to any other level. That is, if a consumer at a community dispersal center needs a procedure or technique which is available only at a base area center, a direct referral pattern must be provided to accommodate this patient. That is, a health care consumer must be allowed the opportunity to "jump" levels of care if the need arises.

THE SYSTEM AS APPLIED TO GREEN BAY AND EASTERN WISCONSIN

The integrated system could quite effectively be applied to Green Bay and the eastern Wisconsin region. The base area center must be the communities with schools of medicine; Milwaukee and Madison.[6] The schools provide the necessary atmosphere for the highest level of medical education, research, and patient care. The schools should serve the broadest possible population base for the efficient use of the frequently expensive modern preventive, diagnostic, and therapeutic procedures and equipment consistent with today's concepts of comprehensive health care.

A regional center should be established at Green Bay. Green Bay, containing three general hospitals, supports a sufficient population to provide the need/demand for health care to warrant a regional center. The exact type, number, and location of the services that should be incorporated into this regional center can not be specified in this study. Such specification could only follow an indepth study designed for this purpose. At present, it is sufficient that recognition be given to the need for integration and the resultant avoidance of unnecessary duplication of service among the three hospitals in Green Bay.

A number of communities possess the community hospitals designated in this study as area centers. These communities could through closer integration with the Green Bay regional center as well as the other health care facilities in the system effectively and efficiently expand their available resources. Communities which contain area hospitals and should relate to Green Bay include Manitowoc, Marinette, Shawano, Algoma, Clintonville, Kewaunee, Oconto, Oconto Falls, Sturgeon Bay, Tigerton, and Two Rivers.

The specifications of the communities which could efficiently utilize the numerous services of the community dispersal unit is unanswerable at this time. The decisions must ultimately rest with the communities themselves and an indepth investigation of relevant factors. It is possible, however, to specify that each area which establishes a community dispersal center should relate to their nearest area hospital and to the regional center in Green Bay.

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[6] When the development of the University of Wisconsin, Green Bay, health curriculum warrants, Green Bay should constitute a base area center.

At the lower levels in the pyramid, the physician's office should also become highly integrated with area hospitals and community dispersal units. Obviously, the greatest needs with respect to the physicians are hospital privileges and identified referral patterns with specialists at all levels in the health care organization.

"HEALTH CAMPLEX"

The system as delineated to date would also provide an excellent vehicle for the introduction of an integrated educational program. Both initial and continuing educational programs could be benefited. The institution of a "health camplex," an education and health care delivery system, is suggested. The "health camplex" would refer to the **total** integration of the educational activities of "teaching hospitals," hospitals with internship and residency programs, and the patient care activities of health care institutions at all levels. Furthermore, these educational and health care processes must certainly be closely interrelated with educational institutions within the region of interest.

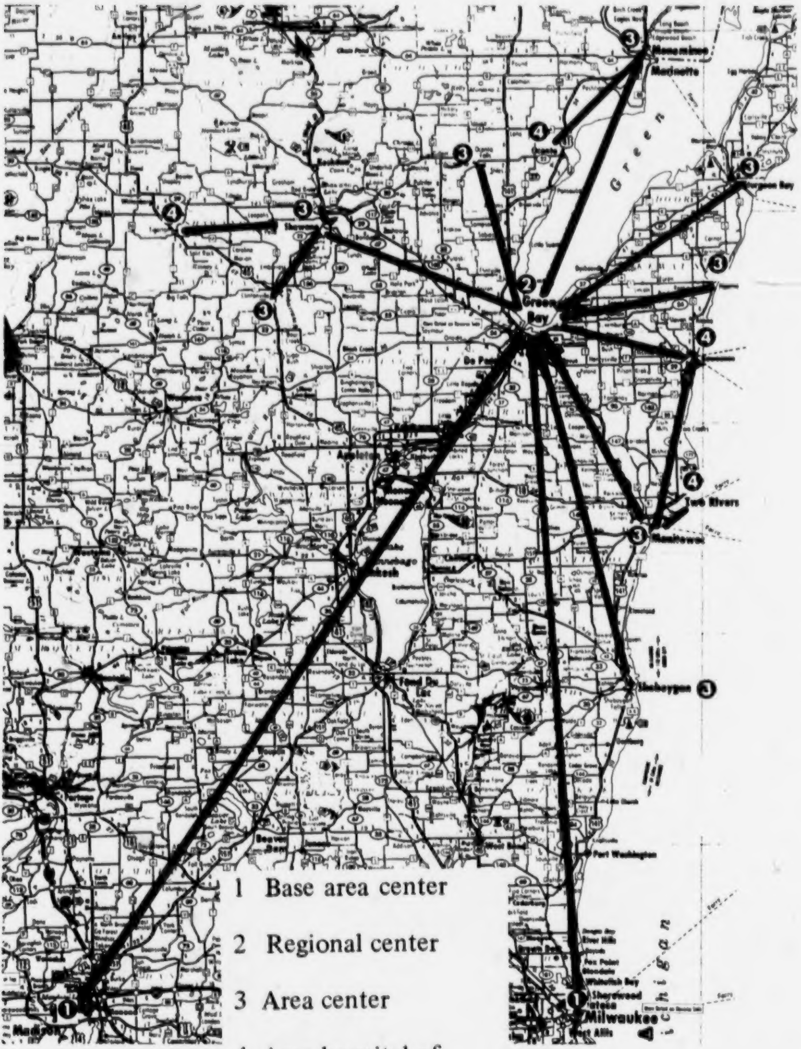
A unique opportunity currently exists in Green Bay to implement such a system. With the development of the University of Wisconsin at Green Bay and its Center System (two year programs at Appleton, Manitowoc, and Marinette) the opportunity to implement a "health camplex" is present. Coordination during the formulative stages of the education system in and surrounding Green Bay would undoubtedly lead to a more integrated system for the future.

INITIAL EDUCATION

One of the primary weaknesses of current health manpower initial education programs is the lack of coordination between those health care institutions which provide educational offerings and those educational institutions charged with primary health care education in the region. The current lack of coordination becomes all the more unfortunate, since opportunities for integration certainly exist.

For example, with the development of the Center Systems of the University of Wisconsin, Green Bay, integration of the education of nursing personnel might be instituted. Diploma nursing programs such as the one at Bellin Memorial Hospital could well utilize the expanding educational facilities at the regional Center Systems. Several advantages are obvious. First, a diploma nursing program would provide an excellent "test vehicle" for the concept of the "health camplex."

Fig. 3-2 -- Integration of health facilities[a]


1 Base area center
2 Regional center
3 Area center
4 Area hospital of community dispersal center
Menominee
Marinette
Green Bay
Two Rivers
Manitowoc
Sheboygan
Fond Du Lac
Port Washington
Shorewood
Milwaukee
West Allis
Madison
Green

[a]Wisconsin State Board of Health, Wisconsin State Plan for Construction and Modernization of Hospital and Medical Facilities, 1966-1967, P. 66.

Certainly the success of such a program would enhance the possibility of the introduction of the **totally** integrated health care and health education system. Second, the utilization of resources at the educational institution would doubtless conserve resources within the hospital. Third, identification of the diploma nursing program with an educational institution would facilitate the concept of "credit transferability." That is, credit earned in the pursuit of a diploma nursing degree, would become acceptable credit toward a more advanced degree, perhaps the baccalaureate nursing degree.

The almost complete lack of "credit transferability" is undoubtedly one of the most serious weaknesses of today's health manpower educational system. Credit earned in the pursuit of one degree is quite infrequently accepted as credit toward a more advanced degree. If this problem is to be rectified and a more efficient educational health education system implemented, health care and educational institutions must integrate the educational programs. The mechanism must involve the enrollment at educational institutions so as to facilitate the maintenance of "quality standards." This is essential if certification of credit earned at one institution (whether classroom work at an educational facility or clinical work at the health care facility) is to be accepted as fulfilling the requirements for a more advanced degree.

While it is imperative that the education of health manpower be primarily based in the educational institution, it is also important that health care officials identify the very important role which health care institutions must continue to play in the initial training of allied health personnel.

Just as health care institutions interrelate in the provision of health care, so should the institutions coordinate in the education of health manpower. Hospitals at various levels in the system might share in the benefits and expenses of the education of allied health manpower. Each health care facility could then contribute the resources which it can most efficiently provide.

For example, Bellin Memorial Hospital has an accredited school for X-ray technology; a program which entails substantial direct clinical experience. Rotation of the students to other area hospitals for clinical experience would accomplish a number of objectives. First, it would allow for the expansion of the X-ray school, since other hospitals would be identified with the primary responsibility for a portion of the training. Second, expansion of the program would provide a larger "pool" of qualified technologists for employment in the region. Third, and of great importance, the program would provide all participating hospitals with valuable supportive health manpower.

Of course, this example does not diminish the need for close coordination between health care institutions and educational institutions. The successful implementation of the concept "health camplex" must await the total integration of all health care and health educational institutions.

CONTINUING EDUCATION

Perhaps of even more immediate importance, the system would provide the opportunity to implement a continuing education program. Close coordination and integration between institutions provides the necessary system for the continual education of health manpower, for example, "periodic refresher courses" at University Medical Schools could and should become mandatory for continuing licensure for practicing physicians. With the "knowledge explosion" in medical techniques and procedures, it is imperative that practicing physicians be instructed on a periodic basis as to new preventative, diagnostic, and therapeutic methods.

A second educational technique should also be employed. A base area hospital coordinated with regional centers, area hospitals, dispersal centers and physician's offices would provide the vehicle for the conveyance through closed circuit television, lectures by educators at the medical centers to practicing physicians and technicians. The speed of dissemination of medical knowledge would undoubtedly be materially improved. The impact on the health of the community through the rapid implementation of improved techniques and procedures would be obvious. It should be noted, also, that educational programs provided by closed circuit television network could ultimately replace the on campus "refresher course" as the requirement for continuing licensure.

Of course, the utilization of closed circuit T. V. should not be restricted to use by physicians. Numerous opportunities exist for use of the closed circuit T. V. in the continuing education of nursing and allied health personnel. One example, would be closed circuit T. V. instruction for the rotating X-ray technicians. Other examples might be the retraining of previously inactive nurses who have chosen to again seek employment, and training programs for nurse aids and orderlies.

SUMMARY

A three stage evolution of our health care system has been identified. The stages were home based, physician's office based, and hospital based systems. The base of health care also represents the primary point of entry into each delivery system.

The essential weakness of the present system or systems, the almost total lack of integration, has led to the suggestion of a fourth stage, an integrated system encompassing all health care institutions, each providing the services which its service area can efficiently utilize. The system, best conceptualized as an inverted pyramid, would include area base, regional and area center hospitals. Community dispersal centers were recommended for those communities which do not enjoy the services of the community hospital, yet possess sufficient population to efficiently utilize the numerous services invisioned in the health care unit. The two lowest levels of the pyramid represent the physician's office and finally the consumer's home, the health care institution providing the fewest number of health services to the smallest population.

Finally, it is suggested that the addition of an integrated educational program would transform the proposed system into a "health camplex." The health camplex was defined as a totally integrated system consisting of both education and health care institutions. The result should be a more efficient and effective supply of those health services that represent the current state of medical knowledge.

SECTION II

HEALTH MANPOWER INVENTORY

Planning for future manpower needs in a health system necessitates a thorough, in-depth analysis of present health conditions; an analysis which simultaneously weights the many relevant elements of manpower need determination. Accordingly, Chapters IV through VI are specifically designed to accomplish this task.

Following the delineation of the present Green Bay health service area, Chapter IV will present a static picture of present levels of need and effective demand for health services in this area. Chapter V will then endeavor to measure the present level of manpower servicing these levels of need and effective demand, and Chapter VI will analyze the sources of this manpower.

Although the significance of these parameters for estimating future manpower requirements hardly needs to be stressed, it would be seen obvious that these are evasive concepts which virtually defy complete and fully accurate measurement. It is contended, however, that the measures constructed in the following three chapters are meaningful and adequately represent present health conditions in the Green Bay service area.

In total, these three chapters lay the foundation for further analysis; an analysis which will focus on future levels of need and effective demand, future manpower needs, and future manpower sources. This analysis will unfold in Section III.

CHAPTER IV

THE GREEN BAY HEALTH SERVICE AREA

INTRODUCTION

An endeavor to measure the need and effective demand for health care in an area must of necessity begin with a geographical delineation of the area. Accordingly, this chapter will initially focus on the Green Bay personal health service marketing or trade area. This marketing area, commonly referred to as the "service area," is defined by the U. S. Public Health Service as:

> The geographic territory from which patients come or are expected to come to existing or proposed hospitals or medical facilities, the delineation of which is based on such factors as population distribution, natural geographic boundaries, and transportation and trade patterns, all parts of which are reasonably accessible to existing or proposed hospital or medical facilities.[1]

The method of service area delineation endorsed in this definition is essentially one of indirect determination. Population distribution, natural geographic boundaries, and transportation and trade patterns are service area indicators, but a method utilizing such factors lacks the degree of accuracy which can be obtained from a direct examination of patient origin data. At the same time, however, this latter method may introduce unavoidable information gaps, and is therefore often suggestive of a degree of accuracy which does not exist. Both methods are widely used and will be jointly employed in delineating the Green Bay service area.

SERVICE AREA DELINEATION

PATIENT ORIGIN DATA

Limited resources preclude an examination of patient origin data for all types of facilities in the Green Bay area, or even a representative sample thereof. Based on the data analyzed for one hospital in the area, however, an estimate or approximation of a service area delineated by patient origin can be obtained.

A 1966 study of the role of Bellin Memorial Hospital in meeting the health needs of Brown County reveals a primary and secondary

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[1] U. S. Department of Health, Education, and Welfare, Public Health Service, *Procedures for Areawide Health Facility Planning*, Public Health Service Publication no. 930-B-3 (Washington: U. S. Government Printing Office, September, 1963), P. 30.

service area for this hospital.[2] As can be observed in Figure 4-1, the primary service area (that region in which the hospitals serve virtually the entire health needs of the populace) consists of Brown County, the western portion of Outagamie County, and a small northwestern segment of Calumet County. The secondary service area (that region where the system's facilities provide care for more complicated diseases, and where general care is provided in the local hospital) includes all of Door County and segments of Marinette, Oconto, Kewaunee, Shawano, and Manitowoc Counties.

The primary service area as thus delineated contained 87.3 percent of the total patients. Brown County constituted 91.8 percent of the patients within this primary area, while Green Bay itself contained 85.8 percent of these patients. The secondary service area contained 7.0 percent of the total patients.

SERVICE AREA INDICATORS

Based on such factors as: (1) population distribution; (2) natural geographic boundaries; (3) transportation and trade patterns; (4) socio-economic factors; (5) existing and proposed patterns of medical care; and (6) other related information including patient origin data, the Wisconsin State Health Department has delineated ninety health service areas for the State of Wisconsin.[3] Figure 4-2 illustrates the Green Bay health service area. As can be observed the service area includes portions of Shawano, Outagamie, and Brown Counties. Patient origin figures comparable to those of the preceding section are not available for the delineated area.

BASELINE FOR DATA COLLECTION

Figure 4-3 combines the two service areas delineated in the manner described above. It is seen that to a large extent the service areas coincide. It is also observed, however, that the service areas dissect several different counties, and that these divisions are not proportional. Consequently, it will be necessary to select a particular region which will adequately represent the service area, and serve as a baseline for meaningful data collection.

Because in this case the most meaningful and reliable service area delineation is the one based on service area indicators, that area delineated by the Wisconsin State Health Department will be designated as the Green Bay personal health service area. Additionally, because data suggests that 91.8 percent of the primary service area patients reside in Brown County, it is readily discernable that both service area

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[2] Gerhard Hartman, "An Analysis of the Hospital and Health Needs of Brown County, Wisconsin with Particular Focus upon the Role of Bellin Memorial Hospital, Green Bay, Wisconsin" (unpublished study, 1966), p. 3.

[3] Wisconsin State Board of Health, *State Plan for Hospital and Medical Facilities,* 1966-1967, p. 14.

Fig. 4-1. - - Green Bay service area based on patient origin data

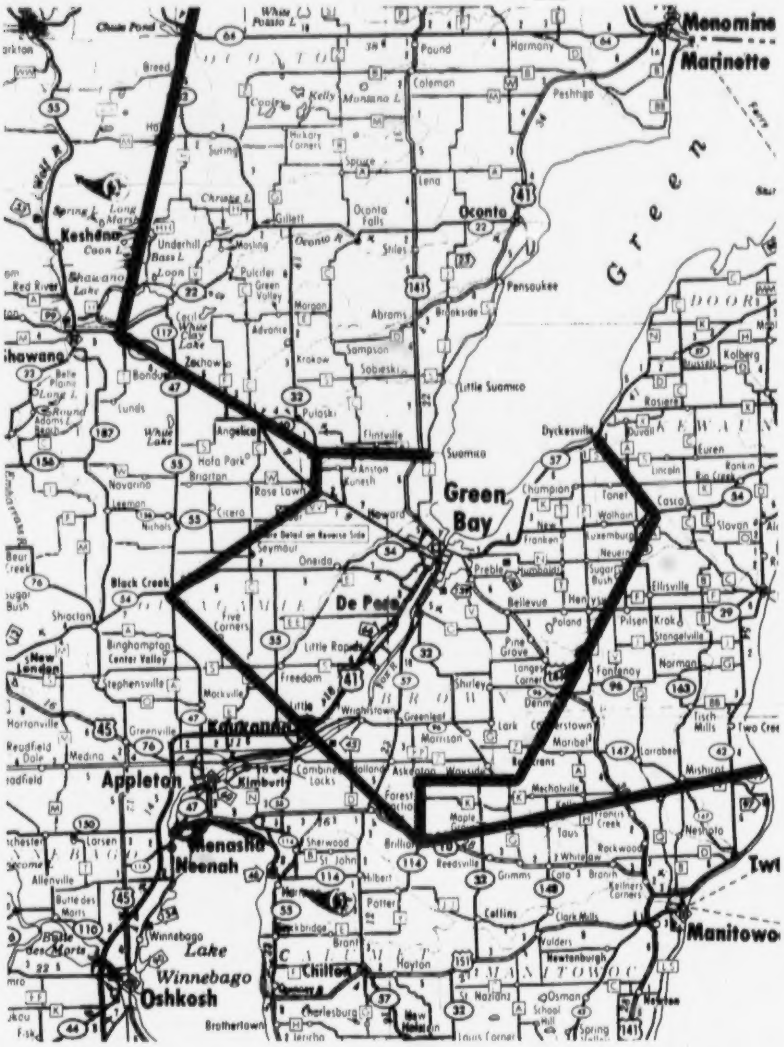

Menominee
Marinette
Peshtigo
Pound
Harmony
Coleman
Lena
Oconto
Oconto Falls
Gillett
Keshena
Shawano
Pensaukee
Abrams
Little Suamico
Suamico
Pulaski
Green
Bay
Green Bay
Dyckesville
Casco
Seymour
Black Creek
De Pere
Denmark
Kaukauna
Appleton
Kimberly
Menasha
Neenah
Lake Winnebago
Oshkosh
Chilton
Brillion
Mishicot
Manitowoc

Fig. 4-2. - - Green Bay service area based on indicators

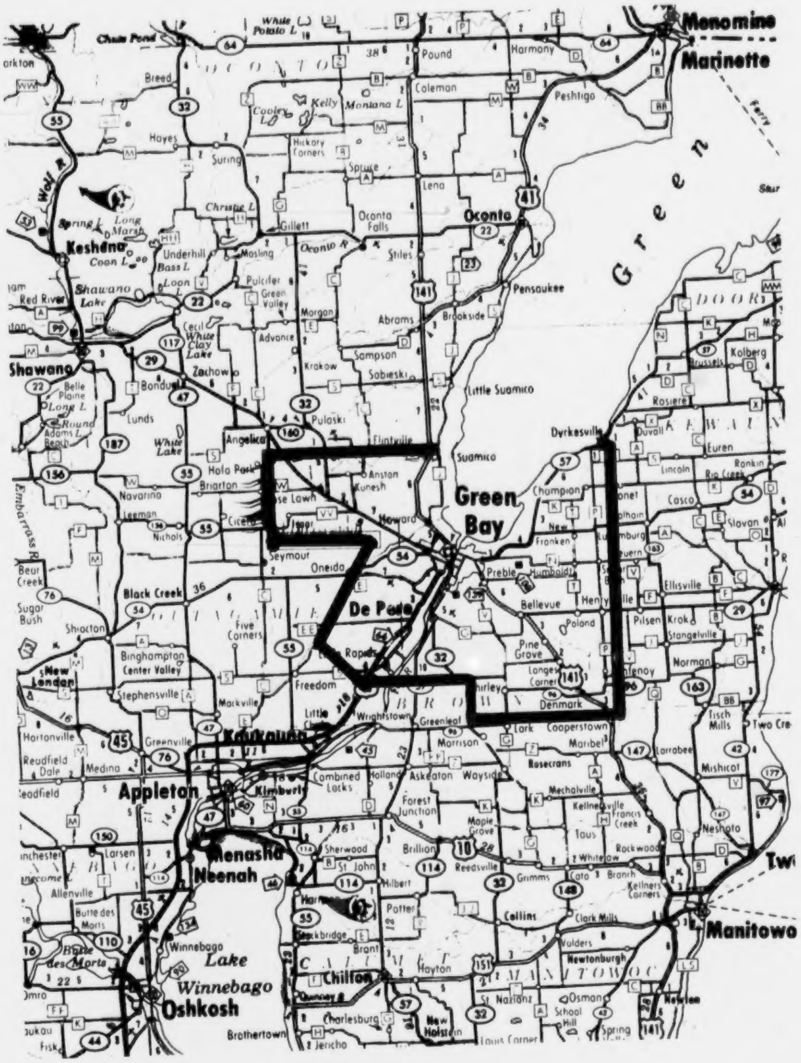
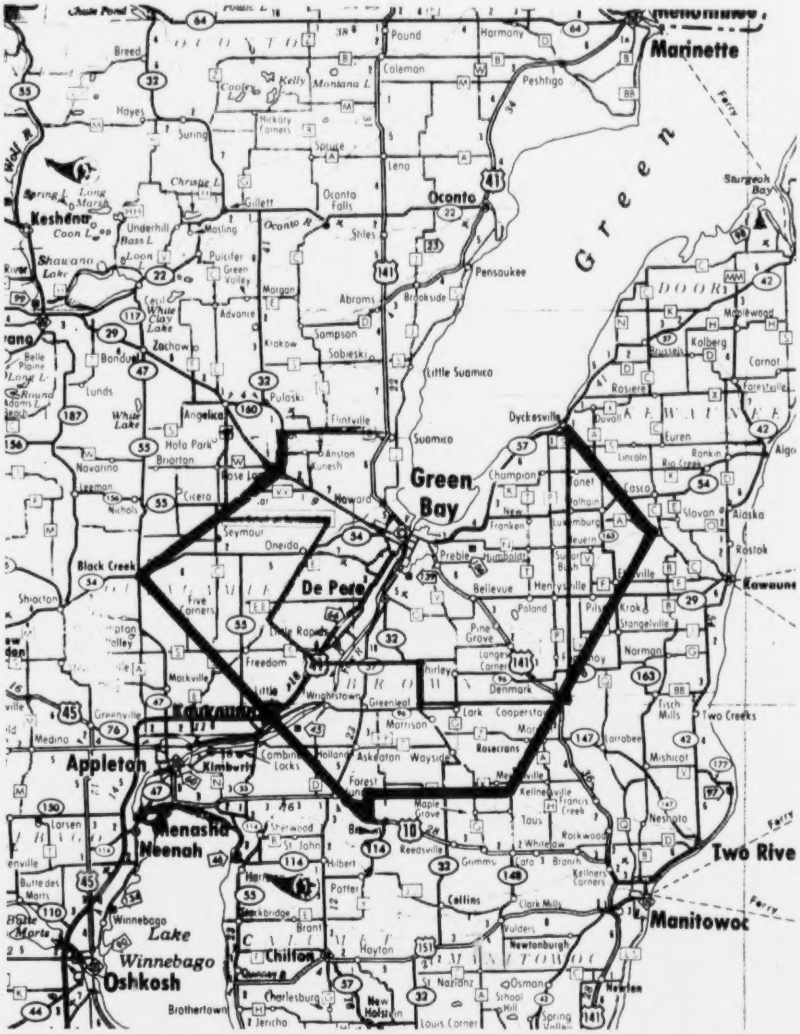

Menominee
Marinette
Green Bay
De Pere
Oconto
Shawano
Keshena
Appleton
Kaukauna
Menasha
Neenah
Oshkosh
Chilton
Manitowoc
Lake Winnebago
Seymour
Pulaski
Suamico
Little Suamico
Denmark
Dyckesville
Pensaukee
Peshtigo
Gillett
Oconto Falls
Wrightstown
Greenleaf
Kimberly
New London
Black Creek
Kewaunee
Door
Brown

Fig. 4-3. - - Combined service areas delineations


Marinette
Pound
Coleman
Peshtigo
Harmony
Breed
Hayes
Suring
Lena
Oconto
Gillett
Oconto Falls
Stiles
Keshena
Shawano Lake
Pensaukee
Green
Sturgeon Bay
Abrams
Brookside
Zachow
Bonduel
Krakow
Sampson
Sobieski
Little Suamico
Pulaski
Angelica
Lunds
Navarino
Flintville
Suamico
Anston
Kunesh
Green Bay
Dyckesville
Champion
New Franken
Luxemburg
Casco
Slovan
Alaska
Rostok
Kewaunee
Algoma
Lincoln
Rio Creek
Rankin
Euren
Duvall
Rosiere
Forestville
Carnot
Kolberg
Maplewood
Cicero
Seymour
Oneida
Howard
Black Creek
Shiocton
Five Corners
De Pere
Preble
Humboldt
Bellevue
Poland
Pine Grove
Little Rapids
Freedom
Mackville
Little Chute
Kaukauna
Wrightstown
Greenleaf
Shirley
Langes Corner
Denmark
Lark
Cooperstown
Morrison
Rosecrans
Kellnersville
Francis Creek
Norman
Krok
Stangelville
Tisch Mills
Two Creeks
Mishicot
Larrabee
Greenville
Medina
Appleton
Kimberly
Combined Locks
Hollandtown
Askeaton
Wayside
Forest Junction
Maple Grove
Brillion
Reedsville
Menasha
Neenah
Sherwood
St. John
Hilbert
Potter
Grimms
Cato
Branch
Whitelaw
Tous
Rockwood
Two Rivers
Manitowoc
Clark Mills
Valders
Newtonburgh
Collins
Chilton
Hayton
Charlesburg
Brothertown
Jericho
New Holstein
St. Nazianz
Osman
School Hill
Louis Corner
Spring Valley
Newton
Oshkosh
Winnebago Lake
Butte des Morts
Larsen
Neshoto
Gibson
OCONTO
BROWN
KEWAUNEE
DOOR
CALUMET
MANITOWOC
Ferry

Service area based on indicators

Service area based on patient origin data delineations are focused primarily on Brown County. Finally, since the social, economic and demographic factors influencing the need and effective demand for care in counties surrounding Brown County would be quite similar to those influencing Brown County, the selected baseline for data collection is Brown County.

In specifying Brown County as a data collection baseline, the point must be made that this designation does not substitute Brown County for the delineated service area. Brown County characteristics will merely be projected to the service area, the latter will still remain intact and serve as the geographical area with which the remainder of this chapter will be concerned.

THE NEED FOR HEALTH SERVICES

The two primary sources of information for determining need for medical care are: (1) mortality rates for specific diseases; and (2) incidence and prevalence rates for specific diseases. Mortality rates provide much information on the occurrence of terminal conditions, and are uniformly available on a state basis. Incidence and prevalence rates, derived from surveys of the occurrence of certain diseases among the living population, are uniformly available only on a national or occasionally on a regional basis. Both are commonly used in attempts to measure the health status of a given populace, and to a lesser extent, to measure the need for treatment and care in a specific area.

The utility of mortality rates as a measure of need has, however, declined considerably in recent years. Because of factors such as improved diagnosis, improved treatment and care, and improved living conditions, all of which make cure more likely than death, mortality rates are no longer an accurate indication of the frequency with which certain diseases occur in the population. Thus, since medical progress has brought more than a proportional increase in nonfatal conditions, these conditions can no longer be accurately predicted by mortality rates. Incidence and prevalence rates derived from surveys of conditions existing in the surviving population therefore provide more accurate information on, and are better indicators of, the need for treatment and care in the population.

However, despite the comparative usefulness of incidence and prevalence rates, there are still many factors which complicate a determination of need for treatment and care in a specific geographical area; factors which restrict the accuracy of such a determination. First, the major share of information on the incidence and prevalence of sickness and disability is provided by the National Health Survey; and this survey is designed to produce accurate estimates only at the national, or occasionally for regional levels.[4] Second, the National Health Survey is based primarily on a series of household surveys, and the persons interviewed can give accurate reports only for conditions of which they are aware. The most serious conditions are most frequently attended by a physician; so to a large extent accuracy of reporting depends on what the physician has told his patients, and the patients ability to recall and willingness to give this information. The National Health Survey is therefore largely concerned with the number of persons who have received care, a parameter which can be accurately determined by other methods; and to this extent does not accurately estimate the number of persons actually needing care, or the number that would benefit from more care.

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[4] U. S. Department of Health, Education, and Welfare, *Origin and Program of the U. S. National Health Survey* (Washington: U. S. Government Printing Office, 1958), p. 5.

Only a program of detailed physical examinations will provide the means to accurately determine the need for treatment and care, but such a program is virtually non-existent. Summaries of Multiphasic Screening Programs conducted by the Wisconsin State Board of Health are available, but the data is collected primarily for the purpose of detecting the occurrence of specific disease conditions in individuals.[5] Under certain circumstances this data can provide an approximate estimate of the rate of occurrence of such diseases, but its general application is quite limited.

It has been found that incidence and prevalence rates as determined by the household interview method, are quite consistent with the findings of independent surveys, and moreover are uniformly available. Thus, although the household interview method is less than ideal for the purpose of estimating the true incidence and prevalence of disease, the results can be used as an indicator of existing conditions in a specific geographical area. Thus, it will be assumed that information gathered by this method from a larger realm can be imputed to a specific sub-region. National Health Survey findings will therefore provide the basis for determining the need for health services in the Green Bay service area.

INCIDENCE AND PREVALENCE RATES

The occurrence of sickness is most often measured by either a prevalence rate or an incidence rate.[6] Prevalence is an estimate of the number of cases existing at a given time. Incidence, by contrast, is a measure of the number of new cases that are developing. Conditions that are of long duration--chronic conditions--are usually measured by their rate of prevalence. Conditions of shorter duration--acute conditions--are measured by their rate of incidence. Combining the prevalence of chronic conditions and the incidence of acute conditions provides an indication of the occurrence of disease, which in turn forms the basis for estimating the need for treatment and care. The remainder of this section will be concerned with this task, as the rates apply specifically to the Green Bay service area.

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[5] Wisconsin State Board of Health, Fact Book: *Wisconsin's Aging Population* (Statistical Service Division, 1964), P. 86.

[6] U. S. Department of Health, Education, and Welfare, *loc. cit.*

PREVALENCE OF CHRONIC DISEASE

The National Health Survey provides information on the prevalence of chronic conditions among noninstitutionalized persons in the U. S. These findings can be applied to the Green Bay service area population, keeping in mind that they are estimates based on national rates, and as such are only indicators. Table 4-1 presents the most recent national chronic disease prevalence rates along with the estimated number of afflicted in the Green Bay service area, by age and sex.

It is observed that 49.1 percent, or approximately 74,028 noninstitutionalized residents of the Green Bay service area are afflicted with one or more chronic conditions; that the prevalence rate is generally higher among females than males; and that the prevalence rate varies directly with age. These findings are further magnified when it is remembered that prevalence rates based on household interviews are, for reasons previously cited, low when compared to rates based on clinical examinations.

The prevalence rates in Table 4-1, however, provide only rough estimates of the severity of each person's affliction, and therefore tend to distort the suggested level of need for treatment and care. The information on prevalence becomes much more meaningful when it is combined with estimates of the associated disability. Table 4-2, based on findings for the earlier survey interval, reveals that of the 44.1 percent afflicted with one or more chronic conditions, 31.9 percent were not limited in their activity. Applying this finding, in terms of percentages, to the data of Table 4-1, it is seen that of the 74,028 noninstitutionalized persons of all ages with one or more chronic conditions, only 23,615 are restricted in their activity. This finding, and similar comparisons by age and sex, suggest a revised estimate of the level of need for treatment and care in the Green Bay service area for chronic conditions; but by no means suggests that those without restriction of activity require no treatment and care.

INCIDENCE OF ACUTE CONDITIONS

In addition to chronic disease, the service area population is also afflicted with acute conditions. For purposes of the National Health Survey, an acute condition is defined as one that lasts less than three months and involves either medical attention or restricted activity.[7]

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[7] U. S. Department of Health, Education, and Welfare, *Acute Conditions: Geographic Distribution, National Health Survey: Health Statistics Series B No. 34* (Washington: U. S. Government Printing Office, 1966).

TABLE 4-1

NATIONAL CHRONIC DISEASE PREVALENCE RATES AND THE ESTIMATED NUMBER OF AFFLICTED IN THE GREEN BAY SERVICE AREA, BY AGE AND SEX, JULY 1965 THROUGH JUNE 1966[a]

Sex and Age	National Prevalence Rate[b]	Number of Afflicted in Green Bay Service Area[c]
	Both Sexes	
All Ages	49.1	74,028
Under 17	22.4	13,509
17-24	43.2	6,188
25-44	59.2	21,689
45-64	70.6	19,266
65+	85.2	10,405
	Male	
All Ages	47.7	35,999
Under 17	23.8	7,320
17-24	42.3	2,999
25-44	57.3	10,287
45-64	68.6	9,192
65+	83.5	4,558
	Female	
All Ages	50.4	38,374
Under 17	20.9	6,176
17-24	43.9	3,176
25-44	60.9	11,379
45-64	72.4	10,056
65+	86.5	5,841

[a] Source: U.S. Department of Health, Education, and Welfare, Chronic Conditions Causing Limitation of Activities, National Health Survey: Health Statistics Series B#34 (Washington: U.S. Government Printing Office, 1966).

[b] Number of cases with one or more chronic conditions per 100 noninstitutionalized persons.

[c] Computed using base population figures.

TABLE 4-2

PERCENT DISTRIBUTION OF PERSONS WITH LIMITATION OF ACTIVITY DUE TO CHRONIC CONDITIONS, BY DEGREE OF LIMITATION ACCORDING TO SEX AND AGE, U.S., JULY 1961 THROUGH JUNE, 1963[a]

Sex and Age	Persons with One or More Chronic Conditions				
	Total	No Limitation of Activity	Limitation but Not in Major Activity	Limitation in Major Activity	Unable to Carry on Major Activity
Both Sexes					
All Ages	44.1	31.9	3.4	6.6	2.3
Under 17	19.9	17.8	1.1	0.8	0.2
17-44	47.5	39.3	3.1	4.5	0.6
45-64	64.1	43.7	5.9	11.6	2.8
65+	81.0	32.3	7.3	25.9	15.5

[a] Source: U.S. Department of Health, Education, and Welfare, *Chronic Conditions Causing Limitation of Activities, National Health Survey: Health Statistics Series B#36* (Washington: U.S. Government Printing Office, 1963).

TABLE 4-2--Continued

Sex and Age	Persons with One or More Chronic Conditions				
	Total	No Limitation of Activity	Limitation but Not in Major Activity	Limitation in Major Activity	Unable to Carry on Major Activity
			Male		
All Ages	42.5	30.4	2.7	6.4	3.1
Under 17	21.4	19.0	1.3	0.9	0.2
17-44	44.9	36.9	2.5	4.7	0.8
45-64	62.3	41.7	4.7	11.5	4.4
65+	79.5	26.9	5.2	25.5	21.8
			Female		
All Ages	45.6	33.3	4.0	6.8	1.5
Under 17	18.4	16.4	1.0	0.7	0.2
17-44	49.9	41.4	3.7	4.4	0.4
45-64	65.8	45.6	7.1	11.8	1.4
65+	82.3	36.7	9.0	26.2	10.3

TABLE 4-3

NATIONAL ACUTE CONDITION INCIDENCE RATES AND THE ESTIMATED NUMBER OF AFFLICTED IN THE GREEN BAY SERVICE AREA, BY AGE AND SEX, JULY 1965 THROUGH JUNE 1966[a]

Condition	National Incidence Rate--Acute Conditions[b]					Number of Afflicted in Green Bay Service Area[c]				
	All Ages	Under 6	6-16	17-44	45+	All Ages	Under 6	6-16	17-44	45+
Both Sexes										
All Acute Cond.	212.0	361.4	251.4	197.8	134.8	319,632	89,906	89,074	100,800	53,247
Infectious & Parasitic	25.1	62.4	37.3	18.6	7.7	37,843	15,523	13,216	9,479	3,042
Respiratory Cond.	125.9	222.9	154.2	109.4	82.3	189,819	55,451	54,635	55,751	32,509
Digestive System Cond.	10.4	15.8	9.5	11.4	7.7	15,680	3,931	3,366	5,810	3,042
Injuries	25.4	26.2	27.0	29.4	18.9	38,296	6,518	9,566	14,983	7,466
All Other	25.2	34.1	23.3	29.0	18.3	37,994	8,483	8,255	14,779	7,229

[a] Source: U.S. Department of Health, Education, and Welfare, *Acute Conditions: Geographic Distribution, National Health Survey: Health Statistics Series B#34* (Washington: U.S. Government Printing Office, 1966).

[b] Number of acute conditions per 100 noninstitutionalized persons per year.

[c] Number of afflicted per 100 persons per year.

TABLE 4-3--Continued

Condition	National Incidence Rate--Acute Conditions					Number of Afflicted in Green Bay Service Area				
	All Ages	Under 6	6-16	17-44	45+	All Ages	Under 6	6-16	17-44	45+
					Male					
All Acute Cond.	203.4	365.0	250.5	174.7	123.5	151,852	46,308	45,265	43,700	23,290
Infectious & Parasitic	24.0	63.4	37.8	13.4	6.9	17,918	8,044	6,831	3,352	1,301
Respiratory Cond.	119.8	221.9	145.4	97.4	77.9	89,439	28,153	26,274	24,364	14,690
Digestive System Cond.	9.7	15.5	8.7	10.9	6.3	7,242	1,967	1,572	2,727	1,188
Injuries	30.6	27.5	35.7	38.0	18.7	22,845	3,489	6,451	9,505	3,527
All Other	19.4	36.7	22.8	15.0	13.6	14,484	4,656	4,120	3,752	2,565
					Female					
All Acute Cond.	220.1	357.6	252.3	218.6	144.7	167,525	43,591	43,862	56,659	29,870
Infectious & Parasitic	26.2	61.3	36.7	23.2	8.3	19,942	7,473	6,372	6,013	1,713
Respiratory Cond.	131.6	224.0	163.3	120.3	86.1	100,165	27,306	28,351	31,181	17,774
Digestive System Cond.	11.1	16.1	10.4	11.8	8.9	8,449	1,963	1,806	3,058	1,837
Injuries	20.5	24.8	18.0	21.6	19.0	15,603	3,023	3,125	5,599	3,922
All Other	30.7	31.4	23.8	41.6	22.4	23,367	3,828	4,132	10,782	4,624

Table 4-3 presents the national incidence rates for all acute conditi together with the estimated number of afflicted in the Green Bay service area, by sex and age.

It is estimated that each noninstitutionalized resident of the Green Bay service area is afflicted with 2.12 acute conditions per year, the most common acute condition being respiratory ailments; that the incidence rate is generally higher for females than males; and that the incidence rate varies inversely with age. Again, it must be stated that these rates, for reasons previously cited, understate the actual incidence of acute conditions. However, because of the recognizable nature of these conditions, it is reasonable to believe that the estimates are reasonably accurate.

Combined with the observation that the incidence of acute conditions, by condition, varies significantly by age and sex, these findings are suggestive of the varying types and levels of treatment and care needed.

THE EFFECTIVE DEMAND FOR HEALTH SERVICES

The effective demand for health services differs from the need for health services in that the persons involved are aware of their need, desire the service, and are able to obtain it. In the past as health services have become more readily available, as the public has become better educated in health matters, as the level of income has risen, and as society has accepted the responsibility of providing medical care for the indigent; medical needs have been converted into effective demand for health services.

The effective demand for health services is measured by the consumption of these services. The effective demand for physicians is reflected by the number of physician visits or the number of conditions seen by a physician. The effective demand for dentists is reflected by the number of dental visits. The effective demand for paramedical personnel is reflected by such indices as the number of hospital admissions, the number of patient days, and the average length of patient stay. Unfortunately, there exists a wide gap between the data necessary to accurately measure the effective demand for health services and that which is available. On the local level, information concerning physician visits or condition seen by a physician as well as dental visits is usually nonexistent. Thus, because statistics on physician and dentist utilization are traditionally not available at the local level, estimates for the area have been derived by applying national and regional rates to the local population base.

DENTAL VISITS

It is estimated that the population of the Green Bay service area visited the dentists 214,345 times in 1965. (See Table 4-4.) The National Health Survey defines a dental visit as "each visit to a dentist's office for treatment or advice. . . .the visit may involve services provided directly by the dentists or by a dental hygienist acting under a dentist's supervision."[8] Table 4-4 presents the number of dental visits per person per year for the small Standard Metropolitan Statistics Area (SMSA) in the North Central Region (Michigan, Ohio, Indiana, Illinois, Wisconsin, Minnesota, Iowa, Missouri, North Dakota, Nebraska, and Kansas) and the estimated number of dental visits by persons in the Green Bay service area by age category.

Table 4-4 also presents the percent distribution of dental visits by the type of service performed according to age for the nation between July, 1963 and June, 1964. The table shows an inverse relationship between age and the percentage of dental visits involving fillings and examinations. In contrast, there is evidence of a direct relationship between age and visits involving extractions. It is feasible to assume that a similar distribution of services would be found in the Green Bay area.

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[8] NCHS, *Medical Care, Health Status, and Family Income*, Series 10, No. 9 (Washington: U. S. Government Printing Office), P. 88.

TABLE 4-4

ESTIMATED NUMBER OF DENTAL VISITS IN THE GREEN BAY SERVICE AREA, 1965[a]

Age	Number of Visits per Person per Year[b]	Estimated Number of Dental Visits
All Ages	1.4	214,345
Under 17	1.3	78,400
17-44	1.7	84,594
45+	1.3	51,351

[a] Calculated from: NCHS, Health Characteristics (Washington: U.S. Government Printing Office, April, 1967), p. 33.

[b] Number of dental visits per person per year for small SMSA's in the North Central Region.

PHYSICIAN VISITS

In 1965, residents of the Green Bay service area made approximately 659,574 visits to physicians. For purposes of the National Health Survey, a physician visit was defined as "a consultation with a physician, either in person or by telephone, for examination, diagnosis, treatment, or advice."[9] The service could have been provided by the physician himself or by a nurse or another person acting under a physician's supervision. Physicians were defined as doctors of medicine and osteopathic physicians. Visits to inpatients of hospitals were not included as physician visits.

Table 4-5 presents the number of physician visits per person per year in the North Central Region, the estimated number of physician visits in the Green Bay service area in 1965 (659,574), and the percentage distribution of physician visits by place of visit for the nation from July, 1963 to June, 1964. The number of visits per person is greatest at the upper and lower age categories. Persons under five years of age averaged 4.8 visits per person between July, 1963 and June, 1964. The number of visits per person dropped sharply to 2.8 visits per person for those persons between the ages of five and fourteen. From this low of 2.8 visits, it rose to 4.6 visits for those persons between the ages of twenty-five and thirty-four, reflecting females in the child bearing ages. There was a slight drop to 4.4 visits per person for persons between the ages thirty-five to forty-four. This slight decrease was followed by a steady increase in the remaining age categories, with a high of 7.2 physician visits per person for those persons seventy-five years of age and over.

The physician's office was indicated as the place where the largest percentage of physician visits occur. The second most popular place for physician visits was the hospital clinic, followed by telephone visits. The telephone visit was utilized most frequently for persons under fourteen years of age.

CONDITIONS SEEN BY A PHYSICIAN

The other index of the effective demand for physicians is the number of conditions seen by a physician. Statistics are reported for both chronic and acute conditions. However, in contrast to physicians visits age-sex specific rates are not available. The data that is available indicates only average rates for the entire population.

It should be noted that a very direct relationship exists between this statistic and the statistic, "physician visits." The number of conditions seen multiplied by the average number of times each condition is seen would equal physician visits. Caution should be noted here,

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[9] NCHS, *Physician visits* (Washington: U. S. Government Printing Office, June, 1965), P. 3.

TABLE 4-5

ESTIMATED NUMBER OF PHYSICIAN VISITS BY AGE AND PLACE OF VISITS, GREEN BAY SERVICE AREA, 1965[a]

Age	Visits per Person per Year[b]	Estimated Number of Visits[c]	Percent Distribution of Physician Visits by Place of Visit					
			Office	Home	Hospital Clinic	Industrial Health Unit	Tele-phone	Other & Unknown
All Ages		659,574						
Under 5	4.8	99,144	58.3	4.2	14.6	--	21.6	1.2
5-14	2.8	94,142	64.6	4.9	12.4	--	16.4	1.5
15-24	4.4	89,558	71.7	2.1	15.2	--	8.1	2.2
25-34	4.6	86,692	73.8	2.4	12.5	1.0	9.1	1.2
35-44	4.4	78,280	75.4	2.7	11.3	1.1	7.7	1.8
45-54	4.8	75,989	76.0	3.1	10.1	1.0	7.3	2.3
55-64	5.0	59,555	77.6	6.0	9.8	--	4.7	--
65-74	6.1	46,903	64.2	17.3	8.5	--	8.2	1.8
75+	7.2	29,311	64.2	17.3	8.5	--	8.2	1.8

[a] Source: NCHS, Physician Visits (Washington: U.S. Government Printing Office, June, 1965), pp. 16, 24.

[b] Visits per person per year for North Central Region

[c] Calculated by applying North Central Region's rates to the population of the Green Bay service area in 1965.

however, since there exists a rather wide variation in the times various conditions require the services of a physician. That is, the average value provides very little information about the number of physician visits required by any specific condition.

Again data is not available for the Green Bay or Brown County area. Consequently, national data for the 1963-64 year period was applied to the local population. The result was an estimated total of 203,087 acute conditions seen by a physician and an additional 122,274 chronic conditions seen. If chronic and acute conditions are totaled, the result is 325,361 conditions seen, or an average of two physician visits for each condition. Table 4-6 provides not only the estimates for the service area but also the national rate per 100 population.

TABLE 4 - 6

CONDITIONS SEEN BY A PHYSICIAN
GREEN BAY SERVICE AREA, 1965[a]

ACUTE CONDITIONS		CHRONIC CONDITIONS		TOTAL CONDITIONS
[b] Rate per 100 pop.	[c] Est. Cond. seen	Rate per 100 pop.	Est. Cond. seen	Est. Cond. seen
134.7	203,087	81.1	122,274	325,361

a. Source: NCHS, Physician Visits, Series 10, No. 18 Washington: (U.S. Government Printing Office, June, 1965), p.3

b. National Rates.

c. Calculated by Applying National Rates to the population of the Green Bay Service Area in 1965.

HOSPITAL UTILIZATION

There are three short-term general hospitals within the Green Bay primary service area: Bellin Memorial Hospital, St. Mary's Hospital and St. Vincent Hospital. St. Vincent is the largest hospital in the area with a bed complement of 440. St. Mary's Hospital and Bellin Memorial Hospital have 133 beds and 155 beds respectively.[10]

Three indices of hospital utilization are employed to measure the effective demand for hospital services in the area: the number of admissions over a twelve month period, the number of patient days over a twelve month period, and the average length of patient stay over a

[10] AHA, *Hospitals, JAHA Guide Issue*, Part II (August 1, 1963-1967).

twelve month period. The results of these indices are reported in Table 4-7 for the five year period from 1962 to 1966.

In 1966, the most recent year for which statistics are available, the three hospitals recorded a total of 31,318 admissions. The total number of admissions for the three hospitals has shown a steady increase since 1962 when there was 28,861 admissions. The largest increases occurred between 1962-1963 and 1964-1965, when increases of 1,385 admissions and 709 admissions respectively were recorded. Individually, the three hospitals all experienced an increasing number of admissions each year with the exception of 1966, when the number of admissions for Bellin Memorial Hospital decreased, while admissions in the other two hospitals increased.

The number of patient days for the three hospitals increased steadily from 177,025 patient days in 1962, to 195,275 patient days in 1964, to 211,335 patient days in 1966; an overall increase of 34,310 patient days in a five year period. Individually, all three hospitals experienced an increase in patient days every year between 1962 and 1966 with the exception of Bellin Memorial Hospital, which experienced a decline of 730 patient days between 1964 and 1965.

It is interesting to note that in the year that Bellin Memorial Hospital experienced a decline in patient days, their number of admissions increased slightly. Additionally, in 1966, when they experienced a decline in the number of admissions, their number of patient days increased. This fluctuation can be explained by observing the average length of patient stay. In 1965, the hospital experienced a slight decrease in the average length of patient stay; and in 1966, the hospital experienced a sizable increase in the average length of patient stay.

The average length of patient stay for all three hospitals combined increased gradually from 6.1 days in 1962 to 6.6 days in 1966. The average length of patient stay at St. Mary's Hospital was considerably less than that of the other two hospitals in 1962, only 5.3 days as compared to 6.6 days at Bellin Memorial Hospital and 6.3 days at St. Vincent Hospital. In 1966, the difference was even greater. Bellin Memorial Hospital had increased to 7.5 days and St. Vincent Hospital had increased to 7.0 days, while at St. Mary's Hospital the average length of patient stay increased only 0.1 of a day to 5.4 days.

In summary, it appears that the three hospitals in the Green Bay area are experiencing an increase in the utilization of hospital services. Not only is the number of patients increasing, they are also staying in the hospital slightly longer.

NURSING HOME UTILIZATION

In 1965 there were eight skilled nursing homes in the Green Bay

TABLE 4-7

INDICES OF HOSPITAL UTILIZATION, GREEN BAY, 1962-1966[a]

Hospital	1966	1965	1964	1963	1962	Net Percent Change
			Number of Admissions by Year			
Bellin	5,461	5,849	5,827	5,944	5,931	- 7.9
St. Mary's	6,628	6,342	5,843	5,849	5,467	+21.2
St. Vincent	19,229	19,121	18,453	18,453	17,463	+10.1
Total	31,318	31,312	30,603	30,246	28,861	+ 8.5
			Number of Patient Days			
Bellin	40,880	40,150	40,880	38,690	39,005	+ 4.7
St. Mary's	35,770	32,485	30,295	29,565	28,835	+24.1
St. Vincent	134,685	133,225	124,100	115,705	109,135	+23.4
Total	211,335	205,860	195,275	184,230	177,025	+19.4
			Average Length of Patient Stay			
Bellin	7.5	6.9	7.0	6.5	6.6	+13.6
St. Mary's	5.4	5.1	5.2	5.1	5.3	+ 1.9
St. Vincent	7.0	7.0	6.6	6.3	6.3	+11.1
Total	6.6	6.3	6.4	6.1	6.1	+ 8.2

[a]Source: AHA, Hospitals, JAHA Guide Issue, Part II (August 1, 1962-1965).

service area.[11] Seven of the homes provided a total of 563 skilled nursing home beds. The eighth home is the Wisconsin Odd Fellows Home and is not included in the total number of skilled nursing home beds reported by the 1966-1967 Wisconsin State Plan. Two additional skilled nursing homes were under construction when the State Plan was being prepared. When they are completed, they will provide an additional 179 skilled nursing home beds in the area.

In 1965, the seven skilled nursing homes reported a total of 381 admissions and 85,045 patient days.[12] The homes operated at a 73 percent occupancy rate, and had an average length of patient stay of 223.2 days.

In addition to the eight skilled nursing homes in the area, there were ten personal care homes with a capacity of 330 beds. These ten homes reported 102 admissions and 101,105 patient days in 1965. Their average daily census was 277 patients and they operated at an 84 percent occupancy rate.

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[11] Wisconsin State Board of Health, *Wisconsin State Plan for Construction and Modernization of Hospital and Medical Facilities,* 1966-1967, p. 118.

[12] *Ibid.*, p. 119.

TABLE 4-8

ESTIMATED NUMBER OF PERSONS WHO RECEIVED CARE AT HOME BY AGE AND TYPE OF CARE, GREEN BAY SERVICE AREA, 1965[a]

Age	Constant Care[b]		Part-Time Care[c]		Total
	National Rate	Estimated Total	National Rate	Estimated Total	
Under 15	1.6	868.4	0.7	379.9	1,248.3
15-44	1.0	568.4	0.9	511.6	1,080.0
45-54	2.2	348.3	1.8	285.0	633.3
55-64	5.9	702.8	3.7	440.7	1,143.5
65-74	10.4	799.7	11.5	884.2	1,683.9
75+	52.7	2,145.4	35.0	1,424.8	3,570.2
Total		5,433.0		3,926.2	9,359.2

[a] Source: Health Statistics, Series B, No. 28, Table A, p. 2.

[b] Constant care means the person can not be left alone. Someone must be in attendance or within call.

[c] Part-time care means the person could not get along without help during certain times or with certain activities.

HOME CARE UTILIZATION

In addition to patients receiving care in hospitals, skilled nursing homes, and personal care homes; a large number of persons receive care in their own homes or in the homes of relatives or friends. Included in this category are persons receiving care in their homes through formal "home-care" programs administered by health agencies and institutions. Table 4-8 presents the estimated number of persons in the Green Bay area receiving care at home by age and type of care, based on national averages. It is estimated that a total of 9,359 persons received care in their homes in 1965. Constant care was required by 5,433 persons, and 3,926 persons required part-time care.

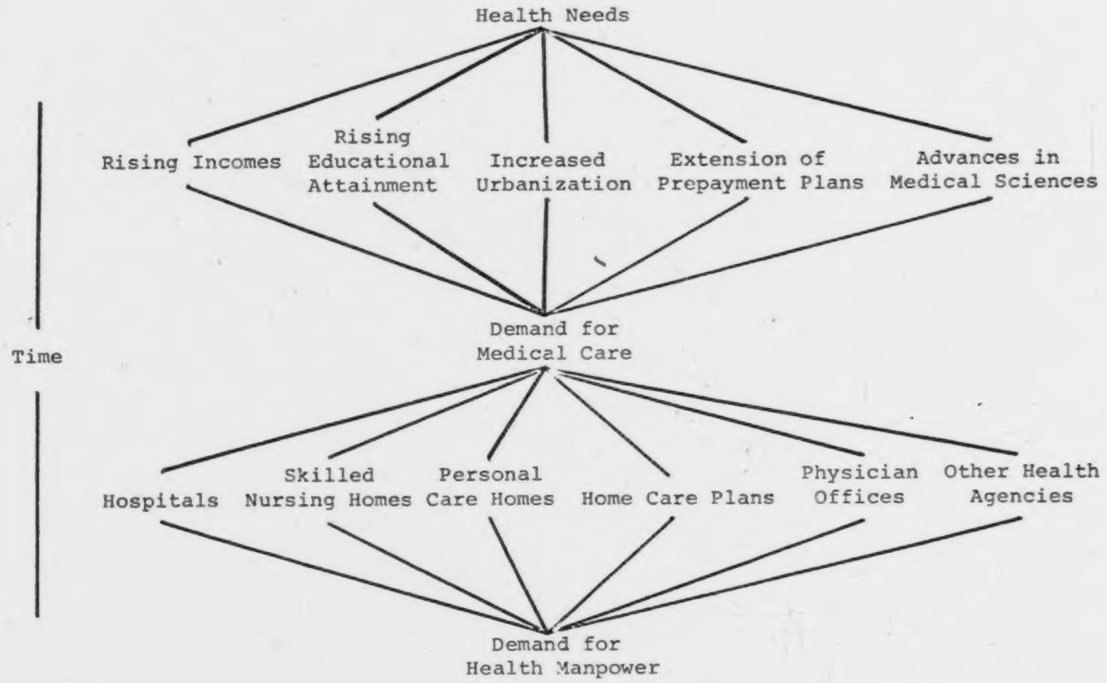
SUMMARY

According to estimates based on national rates determined by the National Health Survey approximately 74,028 noninstitutionalized residents of the Green Bay service area are afflicted with one or more chronic conditions. Of these, approximately 23,615 are restricted in their activity. Additionally, it is estimated that each noninstitutionalized resident of the Green Bay service area is affliced with 2.12 acute conditions per year.

In similar fashion, estimates based on national and regional rates determined by the National Health Survey indicate that approximately 678,418 persons visited physicians in the Green Bay service area in 1965. These physician's visits represented treatment for 325,361 conditions, 203,087 acute and 122,274 chronic. Dental visits during the same year totaled 214,345. In 1965, the three hospitals in the area admitted 31,312 patients and reported 205,860 patient days. During this same period, skilled nursing homes admitted 381 patients and reported 85,045 patient days. Personal care homes admitted 102 patients and reported 101,105 patient days. In addition, it is estimated that 9,359 persons were cared for in their homes or in the homes of friends or relatives.

In assimilating these findings it must be remembered that the public demand for health services is usually quite different from the health needs of the community. Many people do not seek medical care even when in need, others do not seek care because they are not aware of their need, and some seek care when there is no need. To use today's need and effective demand for health services as the sole guideline for determining the health manpower needs of the future would be to ignore the effect that such underlying factors as rising income, rising educational attainment, increased urbanization, extension of prepayment programs, and advances in medical science, will have in converting the unsatisfied health needs of today into effective demand for health services tomorrow. (see Figure 4-4) For short-range planning, the effective demand for health services is probably the most important variable to

Fig. 4-4.--Factors influencing the demand for health manpower


Health Needs
Rising Incomes
Rising Educational Attainment
Increased Urbanization
Extension of Prepayment Plans
Advances in Medical Sciences
Demand for Medical Care
Hospitals
Skilled Nursing Homes
Personal Care Homes
Home Care Plans
Physician Offices
Other Health Agencies
Demand for Health Manpower
Time

be considered. It will have the greatest immediate influence on the demand for health manpower. However, in long-range planning, the unmet health needs of the community must be adequately considered. It will be a great failure if the unmet needs of today are not converted to effective demand for health services tomorrow.

CHAPTER V

HEALTH MANPOWER INVENTORY

INTRODUCTION

Measurement of the level of manpower servicing the effective demand for health treatment and care in the Green Bay service area is no less an evasive task than measurement of effective demand. Here again limitations on the quality and quantity of data place restrictive demands on the complete fulfillment of objectives. Detailed indices of manpower are, however, available for the Green Bay and the eastern Wisconsin area; information which serves as an indicator of, and basis for estimating, the present level of manpower servicing the Green Bay area.

This chapter will examine the manpower indices in Green Bay and eastern Wisconsin in terms of absolute totals of physicians, registered and licensed practical nurses, physical therapists, and other paramedical personnel, and will project findings to the Green Bay service area. These patterns will in some cases be compared to trends evident in the State of Wisconsin and specific regions of the U. S. Additionally, the dynamic facility team mix concept will be introduced and briefly examined.

ABSOLUTE TOTALS

PHYSICIANS

The *American Medical Directory* lists the number of physicians, by medical specialty, in Brown County, as shown in Table 5-1. The largest number of physicians are in general practice (35), general surgery (17) and internal medicine (12). It should further be noted that in excess of one-half of all physicians have undertaken specialization in a particular medical specialty. This movement towards specialization, as discussed previously, is a national trend and is not limited to the Green Bay area or the State of Wisconsin.

Table 5-2 shows the absolute number of physicians in eastern Wisconsin, by county. Brown County with 130 physicians and Outagamie County with 92 physicians, in 1965, accounted for the majority of physicians in the Green Bay and eastern Wisconsin area.

TABLE 5-1

PHYSICIANS, BY SPECIALTY, BROWN COUNTY,
WISCONSIN, 1967[a]

Medical Specialty	Number in Brown County
Allergy	1
Anesthesiology	4
Dermatology	2
General Practice	35
General Surgery	17
Internal Medicine	12
Neurological Surgery	3
Obstetrics and Gynecology	9
Ophthalmology	6
Orthopedic Surgery	4
Otolaryngology	3
Pathology	4
Pediatrics	5
Plastic Surgery	1
Psychiatry	5
Public Health	1
Pulmonary Diseases	1
Radiology	8
Thoracic Surgery	1
Urology	4
Unknown	14
Total	140

[a] Source: American Medical Association, American Medical Directory, 1967.

The number of persons per practicing physician (M. D. and D. O.), and the number of practicing physicians per 100,000 persons for eastern Wisconsin by county in 1965, are presented in Table 5-3. In order to provide a more meaningful comparison, high and low ratios in the State of Wisconsin are also listed.

TABLE 5-2

ABSOLUTE PHYSICIAN TOTALS, EASTERN WISCONSIN, BY COUNTY, 1965[a]

County	Number
Brown	130
Kewaunee	10
Manitowoc	58
Calumet	9
Outagamie	92
Door	12
Shawano	18
Oconto	9
Total	338

[a] Source: Wisconsin State Board of Health, State Plan for Hospital and Medical Facilities, 1966-1967.

Brown County and Outagamie County average respectively 1,084 and 1,204 persons per practicing physician, and Kewaunee, Calumet, Shawano, and Oconto Counties all average over 1,500 persons per physician. It is seen that Iron County, located at the northern tip of Wisconsin, averages approximately 6,600 persons per practicing physician; while Milwaukee averages only 614 - - an extremely low ratio of persons per practicing physician.

Conversely, the number of practicing physicians per 100,000 persons is another scale whereby physician manpower in the eastern Wisconsin area, may be measured. Brown County with 92 per 100,000 and Outagamie with 83 per 100,000 approach a more favorable position than the more than 50 counties averaging below 75 per 100,000 throughout the state. The county of Milwaukee has over 130 practicing physicians per 100,000 persons while Menominee County has no practicing physicians. Of the 72 counties within the State of Wisconsin, only 5 average over 130 practicing physicians per 100,000 persons and 17 fall between 75 and 129. The remaining 50, as mentioned earlier, have below 75 practicing physicians per 100,000 persons.

In estimating additional present and future physician and dentist needs it is important to consider the age distribution of these professional health personnel. Table 5-4 shows this distribution for physicians and dentists in Brown County.

TABLE 5-3

PERSONS PER PRACTICING PHYSICIAN (M.D. AND D.O.) AND PRACTICING PHYSICIANS PER 100,000 PERSONS FOR EASTERN WISCONSIN AND OTHER SELECTED COUNTIES, 1965[a]

County	Persons per Practicing Physician		Practicing Physician per 100,000 Persons	
Brown	1,084		92	
Kewaunee	1,850		54	
Manitowoc	1,316		76	
Calumet	2,716		37	
Outagamie	1,204		83	
Door	1,453		69	
Shawano	1,763		57	
Oconto	2,788		36	
State High	6,600	(Iron Co.)	over 130	(Milwaukee Co.)
State Low	614	(Milwaukee Co.)	0	(Menominee Co.)

[a] Source: American Medical Directory, 1965; American Osteopathic Association Year Book, 1966; Division of Vital Statistics, Wisconsin State Board of Health.

In 1967, there were 13 dentists over age 65 still practicing in Brown County, and 14 dentists under age 34. The largest number of dentists were in the 35 to 44 age category. By 1972 the number of dentists over 65 will have increased from 13 to 21, and it is further expected that not all of these dentists will remain in dental practice. In comparison, the number of dentists under 34 will have decreased to only 2 during this same time interval. Furthermore, the aging of the current practicing dentists will be further magnified by 1977 and especially 1982 as shown in the table.

The number of physicians follow the same trend as is shown in Table 5-4. While there are 15 physicians over age 65, there are only 6 under age 34 presently practicing in Brown County. Most physicians in Brown County are between the ages of 35 and 44. However, by 1977 there will be twice as many physicians over 65, many of whom will have retired from practice. By contrast, there will be only 6 physicians in the 35 to 44 age category unless additional physicians are attracted to the Green Bay area. The total 15 year period illustrates the gravity of this situation even more emphatically.

TABLE 5-4

AGE OF PHYSICIANS AND DENTISTS IN BROWN COUNTY, 1967, AND PROJECTED TO 1982[a]

Age	Dentists				Physicians			
	1967	1972	1977	1982	1967	1972	1977	1982
Under 34	14	2[b]	0[b]	0[b]	6	0[b]	0[b]	0[b]
35-44	19	22	14	2[b]	48	35	6[b]	0[b]
45-54	11	14	19	22	41	40	48	35[b]
55-64	11	9	11	14	17	24	41	40
65+	13	21[c]	24[c]	30[c]	15	28[c]	32[c]	52[c]
Total	68	68[b]	68[b]	68[b]	127	127[b]	127[b]	127[b]

[a] Source: American Medical Association, *American Medical Directory*, Part III, 1967; American Dental Association, *American Dental Directory*, 1967.

[b] This category will be increased by newly trained graduates.

[c] A number of professionals in this category will succumb to old age; others will retire from medical practice.

NURSES

The number of professional (registered) nurses by county of eastern Wisconsin is shown in Table 5-5.

Brown County with 486 professional nurses and Outagamie County with 294 account for over one-half of the total available professional nurses in eastern Wisconsin. Manitowoc County with 229 professional nurses is the only other county which has an abundant reservoir. It must be remembered that the other counties do not have the areas of concentrated population.

Table 5-6 shows the field of employment of the 486 professional nurses in Brown, Outagamie, and Manitowoc Counties.

The data demonstrate that most professional nurses are directly involved in the hospital patient care environment in the three counties surveyed. In descending order of preference is the office nurse, and the private duty nurse. In addition to the 486 professional nurses in Brown County - - there are 82 inactive RN's listed by the State Department of Health and Social Services.

In a similar fashion, the number of licensed practical nurses (LPN's) in eastern Wisconsin may be presented by county and field of

TABLE 5-5

REGISTERED NURSES IN EASTERN WISCONSIN, BY COUNTY, 1965[a]

County	Number
Brown	486
Kewaunee	34
Manitowoc	229
Calumet	30
Door	39
Outagamie	294
Shawano	41
Oconto	42
Total	1,195

[a] Source: Wisconsin State Board of Health, State Plan for Hospital and Medical Facilities, 1966-1967.

employment. Tables 5-7 and 5-8 list these data, respectively. It is observed that more than one-half of all licensed practical nurses are found in Brown County. In fact, Brown County, which has approximately twice as many RN's as any other county, has four times the number of LPN's as does any other county mentioned in the table. This may indicate that the larger hospitals (particularly St. Vincent in Green Bay) utilize LPN's to a greater extent.

Ninety percent of all licensed practical nurses in the three counties surveyed are employed by hospitals. Only 12 of a possible 200 were located in nursing homes, and 6 were in private nursing. In addition to the 133 active LPN's in Brown County, there are 12 inactive LPN's in the county. These individuals could represent a pool of potential health workers.

Estimates have been made of total nursing manpower and additional needs for Wisconsin hospitals for 1966. A summary of these estimates for the entire State of Wisconsin may be found in Table 5-9. Based on state data, proportionate estimates for the eastern Wisconsin area would be possible.

TABLE 5-6

PROFESSIONAL (REGISTERED) NURSES FOR SELECTED COUNTIES, BY FIELD OF EMPLOYMENT, 1965[a]

County	Total	Field of Employment							
		Hospital	School of Nursing	Private Duty	Public Health	School Nurse	Indus-trial	Office Nurse	Other
Brown	486	370	14	27	24	3	12	23	13
Outagamie	294	208	0	14	7	7	15	39	4
Manitowoc	229	173	11	8	13	0	9	10	5
Total	1,009	751	25	49	44	21	36	72	22

[a] Source: The State of Wisconsin, Department of Health and Social Services, Research Division.

TABLE 5-7

LICENSED PRACTICAL NURSES IN EASTERN WISCONSIN, BY COUNTY, 1965[a]

County	Number
Brown	133
Kewaunee	7
Manitowoc	35
Calumet	7
Door	5
Outagamie	32
Shawano	8
Oconto	8
Total	235

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[a] Source: The State of Wisconsin, Department of Health and Social Services, Research Division.

The largest category of additional need is the aides, orderlies, and attendants. This category makes up over one-half of all nursing manpower and is an essential complement to the professional nurse in her day to day hospital functions. The number of professional nurses needed is similar to the aforementioned category even though there are 4,000 additional aides, orderlies, and attendants. Consequently, as a percent of the present number, the additional registered nurses needed is greater. In comparison to other categories of personnel, which will be discussed later, the addition of nursing personnel clearly warrants primary priority in the State of Wisconsin.

ALLIED HEALTH PERSONNEL

The location and number of physical and occupational therapists in eastern Wisconsin, in 1965, is shown in Table 5-10.

Jointly, Brown and Outagamie Counties with 23 physical therapists and 16 occupational therapists supply the overwhelming majority of therapeutic service manpower in the eastern Wisconsin area. This is to be expected since these two counties contain the larger hospitals; hospitals which should offer the greater number of procedures and techniques.

A more complete listing of categories of allied health personnel is available for the entire State of Wisconsin. This data is listed in Table 5-11.

TABLE 5-8

LICENSED PRACTICAL NURSES FOR SELECTED COUNTIES, BY FIELD OF EMPLOYMENT, 1965[a]

County	Total	Field of Employment						
		Hospital	Nursing Homes	Private Nursing	Public Health	Industrial	Office Nurse	Other
Brown	133	114	8	4	0	0	5	2
Outagamie	32	26	3	2	0	1	0	0
Manitowoc	35	33	1	0	0	0	0	1
Total	200	173	12	6	0	1	5	3

[a] Source: The State of Wisconsin, Department of Health and Social Services, Research Division.

TABLE 5-9

NURSING SERVICE PERSONNEL IN HOSPITALS, PRESENT STAFF, APRIL 1966, STATE OF WISCONSIN[a]

Nursing Service Personnel	Present Number	Additional Needed
Registered Nurses	8,131	1,616
LPN's or Vocational Nurses	2,350	826
Surgical Technical Aides	336	99
Aides, Orderlies, and Attendants	12,180	1,689
Total	22,997	4,230

[a] Source: Bureau of Health Manpower, Department of Health, Education, and Welfare, Public Health Service; and the AHA.

TABLE 5-10

LOCATION AND NUMBER OF P.T.'S AND O.T.'S IN EASTERN WISCONSIN BY COUNTY, IN 1965[a]

County	P.T.'s	O.T.'s
Brown	12	8
Kewaunee	0	1
Manitowoc	2	1
Calumet	1	0
Outagamie	11	8
Door	1	0
Shawano	1	0
Oconto	0	1
Total	28	19

[a] Source: Wisconsin State Board of Health, State Plan for Hospital and Medical Facilities, 1966-1967.

TABLE 5-11

ADDITIONAL HEALTH PERSONNEL IN THE STATE OF WISCONSIN[a]

Category of Personnel	Present Staffing	Additional Needed
Diagnostic Services		
Medical technologists	985	286
Laboratory assistants	268	58
Cytotechnologists	25	9
Histologic technologists	72	16
Electrocardiographic technologists	96	11
Electroencephalographic technologists	39	--
Therapeutic Services		
Occupational therapists	87	26
Occupational therapeutic assistants	58	30
Physical therapists	184	75
Physical therapeutic assistants	125	67
Social workers	123	56
Social work assistants	17	--

[a] Source: Wisconsin State Board of Health, *State Plan for Hospital and Medical Facilities*, 1966-1967.

While specific data on these additional health personnel were not available at the time of this writing, there is certainly a correlation of relative need between the entire state and the eastern Wisconsin area. Table 5-9 and the ensuing discussion demonstrate the need for nursing personnel throughout the State of Wisconsin. While nursing was considered of first priority, it can be seen from Table 5-11 that medical technologists are also in short supply throughout the state. Additional personnel are also needed in the categories of physical therapy and social work, as well as in radiology, medical records, dietary, and pharmacy. Deficiencies in health personnel (including nursing) are present not only in the number of full-time employers but also part-time personnel as well. The two logically supplement each other.

The Wisconsin State Board of Health, Division of Research, has estimated a ranking of additional manpower needs for northeastern

TABLE 5-11--Continued

Category of Personnel	Present Staffing	Additional Needed
Therapeutic Services		
Recreation therapists	34	17
Inhalation therapists	125	72
Speech pathologists and audiologists	17	--
Radiology		
Radiologic technologists	466	68
X-ray technologists	88	21
Radiation therapy technologists	16	--
Radiation therapy assistants	3	--
Medical Records		
Medical record librarians	146	44
Medical record assistants	159	26
Dietary		
Dietitians	253	65
Food service managers	117	19
Pharmacy		
Pharmacists	203	64
Pharmacy assistants	92	20
Other Hospital Personnel		
Food service workers	4,461	--
Laundry	1,186	--
Housekeeping	2,844	--
Maintenance	1,374	--
All other (includes management and all secretarial and clerical)	4,995	--

Wisconsin.[1] This estimate, which would include the counties of the Green Bay health service area, appears in Table 5-12.

TABLE 5-12

ESTIMATE OF ADDITIONAL HEALTH PERSONNEL NEEDED FOR EASTERN WISCONSIN

Priority	Number of Additional Personnel Needed
Registered Nurses	56
LPN's	20
Pharmacists	8
Medical Technologists	6
Physical Therapists	3
Total	93

When reviewing the manpower resources of an area it is meaningful to make comparisons between adjacent similar areas, other regions and the nation as a whole. Table 5-13 makes such a comparison.

First, the number of dentists per 100,000 persons in the Green Bay area is 54.5. This ratio compares favorably with the nation as a whole (54.1), but is lower than both the state and the region. Similar areas, as noted by state economic classification, also show a higher ratio. Second, the number of active nurses as opposed to the total number in the nursing profession is a more meaningful statistic. Since only two-thirds of those entering the nursing profession have remained active, the total number of nurses can be misleading. The number of active nurses in the Green Bay area (326.4) may also be compared with the nation (300.0), the state (329.5), and the region (271.9). Third, the ratio of pharmacists (68.4) compares quite favorably with the nation, state and region. Finally, when compared with the State of Wisconsin and the North Central region, a definite shortage of medical physicians may be noted. In comparison with the nation, this deficiency is even more pronounced.

FACILITY TEAM MIX

In examining the manpower resources in the Green Bay and eastern Wisconsin area, absolute totals, as presented in the previous section, should be supplemented by a discussion of facility team mix (FTM). A

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[1] Northeastern Wisconsin here refers to District Six as delineated by the Wisconsin State Board of Health. District Six includes the following counties: Oconto, Brown, Door, Shawano; Kewaunee, Outagamie, Marinette, Menominee, and Waupaca.

TABLE 5-13

RATIO OF PERSONS IN FIVE HEALTH OCCUPATIONS AND OTHER DATA TO POPULATION, BY NATION, REGION, STATE AND STATE ECONOMIC AREA, 1962[a]

Occupation	Per 100,000 Population							
	United States	Green Bay (SMSA)	State Economic Area[b]	Wisconsin	North-east	North Central	South	West
Dentists	54.1	54.5	58.9	63.0	70.3	55.5	36.9	59.8
Total Nurses	449.8	399.4	380.2	398.1	646.8	395.0	302.8	523.9
Active Nurses	300.0	326.4	319.9	329.5	412.5	271.9	214.8	338.9
Pharmacists	66.7	68.4	58.9	64.8	80.9	65.6	54.8	69.4
M.D.'s	142.9	87.6	88.3	114.5	176.3	122.3	121.1	170.0
D.O.'s	7.9	3.8	2.5	4.1	7.0	10.2	3.9	13.1

[a] Source: U.S. Department of Health, Education, and Welfare, Public Health Service, PHS Publication No. 263, Health Manpower Source Book, Section 19, location of manpower in 8 occupations.

[b] State economic areas are relatively homogeneous subdivisions of states, these subdivisions consist of single counties or groups of counties having similar economic or social characteristics. In the establishment of these areas by the Bureau of the Census, demographic, climactic physiographic, and cultural factors, in addition to industrail and commercial activities, were considered.

FTM approach must make use of personnel data from all health facilities in the area or region being examined. A lack of total response from hospitals, nursing homes, and other extended care facilities in the Green Bay area limited the capabilities of this inventory in providing a FTM presentation. A facility team mix, however, can be partially demonstrated for the three acute short-term general hospitals of Green Bay in Table 5-14.

First, it should be noted that the difference in the number of personnel is commensurate with the overall difference in the size of the hospitals. Bellin Memorial Hospital has presently 155 beds, St. Mary's Hospital, 133, and St. Vincent Hospital 440 beds. Table 5-14 is similar to Table 5-11 in that the categories of personnel listed are similarly divided into diagnostic, therapeutic, radiologic, nursing, medical records, dietary, pharmacy and other hospital personnel. The number of full-time and part-time employees are both shown in the table.

Since Table 5-14 is basically self-explanatory, the primary emphasis of this discussion will center on the manpower category which appears to have the greatest need for additional health personnel, therapeutic services. For example, there is only one occupational therapist serving St. Vincent Hospital, while neither St. Mary's or Bellin Memorial have the services of this specialist. Furthermore, Bellin Memorial has no full-time physical therapist, and St. Mary's and St. Vincent Hospitals have only one full-time member each.

The number of occupational and physical therapist assistants is logically commensurate with the number of therapists. Accordingly there are no occupational therapist assistants in any of the three hospitals, and only five full-time physical therapist assistants in St. Vincent Hospital and one in St. Mary's Hospital. There are no social workers, social work assistants, or recreation therapists, in any of the three hospitals. Bellin Memorial, St. Vincent and St. Mary's hospital have two full-time, three full-time, and two part-time inhalation therapists, respectively. Finally, there are no speech pathologists and audiologists in the three hospitals.

Optimally, a FTM approach complements the data presented in absolute totals. The FTM survey lists each health facility and also each category of personnel which contribute to the effective functioning of the medical specialist or physician. Categories of facilities include not only acute short-term but also long-term psychiatric, long-term rehabilitative, chronic care, research/educational, and other extended care.

In order for the optimum delivery of health services to be accomplished, future health manpower studies of the Green Bay and eastern Wisconsin area should attempt to place the FTM approach in better perspective.

This would, of course, necessitate a need for a clear delineation of

TABLE 5-14

FACILITY TEAM MIX OF PERSONNEL IN ACUTE-SHORT TERM GENERAL HOSPITALS, GREEN BAY, WISCONSIN, APRIL 1966

Category of Personnel (Part-Time)	Bellin Memorial	St. Vincent	St. Mary's
Diagnostic Services			
Medical technologists	6(2)	12(9)	6(1)
Laboratory assistants	--	2(8)	1
Cytotechnologists	1	--	--
Histologic technologists	2(1)	1(1)	1
Electrocardiographic technologists	--	2	--
Electroencephalographic technologists	--	2	(1)
Therapeutic Services			
Occupational therapists	--	(1)	--
Occupational therapeutic assistants	--	--	--
Physical therapists	--	1(3)	1(1)
Physical therapeutic assistants	--	5	1
Social workers	--	--	--
Social work assistants	--	--	--
Recreation therapists	--	--	--
Inhalation therapists	2	3	(2)
Speech pathologists and audiologists	--	--	--
Radiology			
Radiologic technologists	3	11(2)	2(1)
X-ray technologists	7	--	(1)

TABLE 5-14--Continued

Category of Personnel (Part-Time)	Bellin Memorial	St. Vincent	St. Mary's
Radiology			
Radiation therapy technologists	--	--	--
Radiation therapy assistants	--	--	--
Nursing Service			
Registered nurses	38(28)	93(81)	28(41)
Licensed practical nurses	20(9)	52(20)	26(5)
Aides, orderlies and attendants	48(13)	121(48)	33(45)
Medical Records			
Medical record librarians	1(1)	1	2
Medical record assistants	--	--	1(1)
Dietary			
Dietitians	(2)	3	1
Food service managers	1	--	1
Pharmacy			
Pharmacists	1	3	1(1)
Pharmacy assistants	1	2	1
Other Hospital Personnel			
Total other hospital personnel	227(102)	568(269)	179(126)

the categories for health manpower, so that comparable data in terms of health careers can be collected and analyzed. The United States Department of Labor, Manpower Administration, has published a guidebook entitled *Health Careers* which might be utilized to accomplish this objective.

SUMMARY

In this chapter 140 physicians in Brown County were listed by specialty, the largest number being in general practice, general surgery, and internal medicine. The number of persons per practicing physician in Brown County is approximately 1,100 and there are 92 physicians per 100,000 persons in the county. There are 486 active registered nurses and 82 inactive nurses in Brown County. Of the 486 active nurses, 370 work in hospitals, with an additional 50 in private duty or an office capacity.

There are 133 active LPN's in Brown County and 12 inactive. These LPN's are also largely employed by hospitals. While there are almost 23,000 nursing service personnel in the State of Wisconsin, there is a present need for approximately 4,230 additional nursing employees.

Brown County has 12 physical therapists and 8 occupational therapists, which accounts for almost one-half of the total therapists in the Green Bay area.

While specific data on additional allied health personnel was not available for the Green Bay area, a comparison was made between the needs of the entire state and those of northeastern Wisconsin. The Research Division of the Wisconsin State Board of Health listed manpower need by priority as follows: (1) 56 additional registered nurses, (2)20 LPN's, (3) 8 pharmacists, (4) 6 medical technologists and 3 physical therapists.

An abbreviated FTM approach has been presented for the three acute short-term general hospitals of the Green Bay region. The most conspicuous lack of personnel was in the therapeutic services. While an extensive facility team mix presentation was limited due to inadequate response from health facilities of the Green Bay area, the philosophy of such an examination was postulated. More emphasis should be placed on such a FTM approach in the future.

CHAPTER VI

SOURCES OF HEALTH MANPOWER

INTRODUCTION

Maintenance of the current level of quality health care in the United States is dependent upon the ability of our educational institutions to supply adequately trained professionals and subprofessionals in sufficient numbers. In medicine, at least, the quality-quantity dichotomy has become a familiar theme of health economics. Ward Darley has pointed out that, with the greater medical school emphasis on advanced training, there was a growth of 82 percent in graduate medical training in the period 1959 to 1964, but first year medical school classes grew only 7.9 percent in the same period.[1] The output of physicians has failed to be consistent with the growth of the population.

In another major area of health, nursing, the dilemma which exists will not be easily solved. Nursing is at a point similar to medicine two centuries ago. Much of the training is still undertaken within the hospital apprenticeship system, but increasingly, education of nurses is moving into the academic world.[2] Quantities of nurses trained in either program are inadequate. Other allied health professions such as pharmacy, medical technology, and radiology technology are at varying points along an academic apprenticeship continuum.

In this nation, today, concern for the education of well-trained health personnel has become the salient feature of any discussion of health manpower. The problem of training is that of increasing the quantities of professionals economically. The health professions are aware of the need for coordinated action among themselves and the sources of funds for education. Lowell Coggeshall was especially cognizant of this when he stated that the professions must be ready to take the necessary steps to insure adequate personnel, or those less well equipped to prepare manpower will undertake to do so by the pressure of public demand.[3] He further notes that the lead time in the progression from the decision to establish a school in any particular professional discipline to the time that that school is fully operative is such that the decisions must be made **now**.[4]

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[1] Ward Darley, "Medical School Financing and National and Institutional Planning," *The Journal of Medical Education,* XLI, No. 2(February, 1966), 101.

[2] Mary K. Mullane, "The Changing Responsibilities of the Hospital for Undergraduate and Graduate Education in the Allied Health Sciences," *General Session Papers: Centennial Symposium, University Hospitals of Cleveland,* p. 39.

[3] Lowell T. Coggeshall, *Planning for medical Progress through Education,* A Report Submitted to the Executive Council of the Association of American Medical Colleges (April, 1965), P. 13.

Of course, there are many reasons why schools can not be established immediately, nor existing ones expanded. Of first and second magnitude in this respect are the factors of finance and faculty. In the case of provision of faculty, the problem is primarily circular. There are too few adequately educated teachers, and there are too few teachers because there are too few graduate schools producing them. There are too few graduate schools in the health sciences because there are too few teachers to instruct in them.[5] It is a situation that is being remedied, but only slowly, and in the meantime, training undertaken in hospitals is often of doubtful quality, and furthermore other potential students are simply not being trained due to lack of programs.

Fortunately, the problem of finances has become less significant in terms of creating the public interest to provide the financial resources for the training of health manpower, but rather it is now the problem of obtaining sufficient funds to do the job. The "rapid expansion of education at public expense" is indicative of the realization that the goal of adequate health resources available to all segments of society is now considered to be a right of society.[6] The federal government has moved into the area of health manpower with several programs: Health Professions Educational Assistance Act of 1963; the Nurse Training Act of 1964; the Health Professionals Amendments of 1965; and the Allied Health Professions Act of 1966. These are designed to provide for the construction of facilities, establish student loans and provide grants and scholarships to all categories of students.[7] But, at a time when the world is in turmoil, and other national goals are of great importance, 30 billion dollars is provided to put a man on the moon, 100 billion dollars is provided to explore space, 2 billion dollars **per month** is provided for the war in Southeast Asia, and only 4 billion dollars is provided over the next **ten years** for the expansion of a primary health educational resource: medical schools.[8]

The hospital has remained a primary source of health manpower. Although medicine long ago gave up apprenticeship for basic education in the medical school or university, much medical learning is still conducted through the internship and residency programs of hospitals.

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[4] *Ibid.*

[5] Thomas P. Weil and Henry M. Parrish, "Development of a Coordinated Approach for the Training of Allied Health Professionals," *The Journal of Medical Education,* XLII, No. 7 (July, 1967), 651.

[6] Mullane, *op. cit.,* p. 38.

[7] Darley and Somers, *The New England Journal of Medicine,* CCLXXVI, 1295.

[8] Alex Gerber, "The Medical Manpower Shortage," *The Journal of Medical Education,* XLII, No. 4 (April, 1967), 314.

Similarly, while nursing is increasingly being taught as a science in the university, the art of nursing, as taught in the hospital school, is still the greatest source of trained professional nurses.[9] Great advances have come through the training of professionals in the hospital environment, and the role of the hospital must still be considered to be of utmost significance in the provision of personnel.[10] The question now becomes one of the ability of the hospital to adapt to the requirements of modern education, for the hospital is not controlled by strictly scholarly interests, and must provide services and research in addition to teaching. To this may be added the further requirement that the teaching personnel must often engage in administration.[11] In other words, there are several factors limiting the effectiveness of the hospital as an educational institution at the community level, not the least of which is the problem of economies of scale in the use of faculty, and the fact that the primary controlling group of education in the hospital is the physician.

SOURCES OF SUPPLY

SCHOOLS OF MEDICINE

As the Coggeshall report notes, the place of medical education is almost uniformly within the university, although formal training beyond the M. D. degree is a matter of little concern to the university.[12] The locus of medical education is firmly established within the university and has been for a half century since the time of the Flexner Report, but it has become apparent in recent years that the medical schools of universities are unable to produce the numbers of physicians required in a growing society increasingly sophisticated in its knowledge of medicine. The demands are such that the medical profession has cast about for various ways of increasing the flow of well-trained physicians.

One method has been the reliance on foreign trained doctors. It has been estimated that 3,300 foreign trained physicians are entering the medical profession in the United States every year.[13] In 1960 it was estimated that the nation required twenty to twenty-four new schools of medicine.[14] Some of these are in the process of being established, but whether from the economic desire to limit competition, or the lack of foresight; what has been done has been inadequate. At the same time, many schools are in serious financial trouble. The Association of American Medical Colleges reported in December, 1967 that ten schools of medicine are operating at less than half the average cost of all schools; that is, at these ten schools, the per student expense is $5,720 as opposed to $11,618 as the national average.[15] While mere expenditures are not to be taken as definitive of the level of education or even the financial condition of the school, these findings are certainly indicative of limited resources and limited income--possibly a fatal combination. The article goes on to note that the loss of even one School at this time would be tragic.

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[9] John S. Millis, *The Hospital as an Educational Institution*, The Ninth D. Spencer Berger Lecture (Yale-New Haven Medical Center. April 30, 1964), P. 8.

[10] Mullane, *op. cit.*, p. 37.

[11] Millis, *op. cit.*, p. 5.

[12] Coggeshall, *op. cit.*, p. 10.

[13] Ward Darley and Anne R. Somers, "Medicine, Money, and Manpower - The Challenge to Professional Education, III. Increasing Personnel," *The New England Journal of Medicine*, CCLXXVI (June 22, 1967), 1416.

SCHOOLS OF NURSING

Traditionally, the nurse has been educated within the hospital in the three-year diploma course. Training at this level has produced most of the registered professional nurses in the country, but in the last twenty years, there has been a notable trend toward the collegiate degree in nursing. Students about to enter nursing, if they are of high caliber, are willing to attend school the additional year and obtain the baccalaureate degree. While the trend to the university environment is desirable for the production of nursing leadership, "it is obvious that the diploma schools must not close their doors too fast--a real danger resulting more from economic reasons than from (the position taken by the American Nurses' Association in favor of the baccalaureate graduate)"[16] Mary Mullane makes the same observation: "Whatever the future may hold for hospital ownership of schools, the present requires their continuance until technical nursing education within the school system is general enough and sound enough to serve the public need.[17]

In 1963, the Surgeon General's Consultant Group recognized this same fact in recommending that existing diploma schools be improved, strengthened, and expanded. At the same time, the report also noted the fact that one-third of those entering diploma schools do not complete the course.[18] This points to the weakness of the education available in a situation of less than total commitment to scholarship. Hospitals are loath to relinquish what has long been a source of inexpensive manpower furnished under the outmoded apprenticeship system. Mullane, again, speaks of the one of four graduates of unaccredited diploma schools who fail their state board exams on the first attempt. She would demote these schools to LPN schools and strengthen the more viable programs.[19] Obviously, this will represent the future trend. Only relatively large community hospitals willing to operate schools for the production of trained professionals rather than as sources for cheap labor, and willing to make the necessary financial commitments should be permitted to continue in the business of educating RN's. Their programs should be encouraged and expanded. In every case where it is feasible, a college or university affiliation should be undertaken so that the nurses produced in these programs will be granted academic degrees.

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[14] Somers and Somers, *op. cit.*,p.p.125.

[15] Association of American Medical Colleges "Educational Support Needs of Schools with Limited Financial Resources," *Datagrams*, IX, No. 6 (December, 1967).

[16] Darley and Somers, *loc. cit.*, p. 1417.

[17] Mullane, *op. cit.*, p. 41.

While the education of the professional nurse is the main arena of debate, and the source of most soul searching on the part of hospitals and the nursing profession, nursing is a splintered profession educationally and practically. Recent developments include the associate degree nurse. She is a graduate of a junior college course in nursing, and may be registered as a professional nurse in most states. The American Nurses' Association has gone on record favoring that many present diploma schools obtain a community college affiliation in order that their products might have the associate degree, and academic degree.[20]

A final major source of nursing manpower are those courses producing licensed practical nurses (in Wisconsin, trained practical nurses). The LPN has proved to be the savior of many hospitals. In terms of sheer manpower with sufficient training to be immediately useful to the hospital, the LPN has more than proved her worth. The precise position and future significance of the LPN are difficult to determine. Both education and licensing varies among states and it will be some time before LPN's are uniformly licensed and accredited.[21]

SCHOOLS OF DENTISTRY

Dentistry has been in much the same position as medicine regarding shortages of personnel, and the lack of teachers and educational institutions to prepare students. Fortunately, dentists have been successful in alleviating the problem of scarce manpower through the use of technical assistants and the preventive dentistry program. Between 1949 and 1965, there was an increase in the number of dental schools from forty-one to forty-nine.[22] Not only are there requirements for more dentists, but there will be a similar increase in the need for dental assistants, whether trained on the job or in school.

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[18] U. S. Department of Health, Education and Welfare, Public Health Service, *Toward Quality in Nursing--Needs and Goals,* Report of the Surgeon General's Consultant Group on Nursing (Washington: U. S. Government Printing Office, 1963), pp. 11-12, 35.

[19] Mullane, *loc. cit.*

[20] Darley and Somers, *loc. cit.*

[21] *Ibid*

SCHOOLS FOR ALLIED HEALTH PERSONNEL

Dr. John A. D. Cooper, writing in *The Journal of Medical Education*, quotes former President Clark Kerr of the University of California as noting that the point of entry and hence professional respectability of the allied health professions is becoming the university. And the challenge of education through occupational pursuits is no longer of primary importance to the emerging new professions.[23] The allied professionals at all levels represent a most disturbing ambiguity of American society. There simply are not enough to serve the needs of the nation adequately, yet this is in a time of labor surpluses.[24] The only answer, according to Lowell Coggeshall is simply to train more people.

The training of these professionals and subprofessionals is a patchwork of varying requirements and professional or legal restrictions. The categories range from administrative personnel through orderlies, medical technologists, radiologic technologists, laboratory assistants, dieticians, social workers, medical record librarians, and the variety of therapists.[25] Education is undertaken on the job or at the highest levels of the academic world.

Unfortunately, the university is not as involved in the training of these allied professions as it might be. Much is left to the community hospital with its relatively slim resources and limited faculty.[26] It becomes very expensive to train twenty technicians in the hospital if an adequate faculty is to be provided. It has become necessary to form schools of associated health professions in order to attract enough students to justify a well-trained faculty.[27] This has the tendency to alleviate bottlenecks resulting from the lack of teachers and coordination

[22] *Ibid.*

[23] John A. D. Cooper, "The University and Its Medical Center," *The Journal of Medical Education*, XLI, No. 6 (June, 1966), pp. 500-501.

[24] Coggeshall, *op. cit.*, p. 27.

[25] Darley and Somers, *loc. cit.*

[26] Mullane, *op. cit.*, p. 39.

[27] Weil and Parrish, *loc. cit.* p. 652.

of separate and splintered activities.[28]

A tremendous potential source of allied personnel has been the two year junior college. In this environment, with affiliation with suitable four year colleges having clinical facilities, or selected hospitals, qualified personnel may be trained for the subprofessions.[29] This effectively removes the educational responsibility from the individual hospital, while at the same time, maintaining the participative role of the hospital and staff in the training of personnel.

The similarity of the requirements of various allied health personnel for instruction in the basic sciences and many of the same courses has inevitably led to the conclusion that there needs to be greater integration of the various programs into a comprehensive whole. The most obvious and only suitable place for this integrated program must be in the academic environment, with the hospital affiliation maintained for the necessary clinical experience. This proposal begins to sound very much like medical education, or nursing education at the baccalaureate level. The implication is obvious. It would appear that the only factor preventing practical integration of all health sciences into a single school has been professional jealousies and the unwillingness to admit that certain subprofessions require university education. James Dixon, in commenting on the Manpower issue of *The Journal for Medical Education* (September, 1966) calls for the establishment of a superordinant faculty in the health professions, and on a worldwide basis.[30] This would make available to all students the total resources of the schools undertaking such efforts, the primary resource being a superior faculty. It would appear, that aside from medicine, the constricting influences are the other more established professions: nursing and dentistry, which even within the university environment have enjoyed considerable autonomy.[31]

THE COMPREHENSIVE PROPOSAL

Eventually, it appears that most technical training along with the training of physicians and nurses will have to take place within the college or university. The time to anticipate such a development is now. For the hospital that is currently committed to an extensive educational program, association with a college or university interested in the education of health manpower should be considered. At all levels, there should be coordination of the education opportunities available to students in the health sciences.

Organizationally, five possible schemes have been suggested for the coordinated programs. They have been stated briefly by Thomas Weil and Henry M. Parrish in the Journal of Medical Education (July, 1967). They are:

1. Associate dean responsible for allied medical programs reporting to the dean of the college of medicine, with all four years of undergraduate work being undertaken on the same campus, or with three years on the main campus and the fourth year on the medical school campus.
2. Director of a school of allied health sciences reporting to the dean of the college of medicine.
3. Dean of a college of allied health sciences reporting to the universities vice-president for medical and health affairs. Each program could have departmental or section status.
4. Director of a division of allied health sciences in a junior college.
5. Associate dean responsible for allied medical programs reporting to the dean of a school of public health.[32]

There exists, then, a variety of possible organizational patterns for establishing coordinated programs in the health sciences, and while the primary emphasis is on the university containing a medical center, there is certainly opportunity for colleges and hospitals to combine to found a viable program in the allied health professions. Before doing so, Weil and Parrish suggest a further list of considerations, preparatory to the actual founding of such a school or program:

1. Is there a demonstrable need for such additional allied medical personnel?
2. Is the proposed new program or the expansion of an existing program compatible with the goals and role of the institutions?
3. Is there considerable professional interest and support for the program?
4. Is there an adequate faculty available or the possibility of recruiting one?
5. Is there an adequate number of qualified students interested in the program?
6. Is temporary financial support forthcoming from interested professional groups or foundations?
7. Is the short- and long-range cost to the college or university consistent with similar programs?
8. Is the standard established by the accrediting body or approving body consistent with college or university policies?

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[28] Howard S. Hoyman, "Bottlenecks in Health Education," *American Journal of Public Health,* LVI, No. 6 (June, 1966), 957.

[29] National Commission on Community Health Services, *op. cit.,* p. 97.

[30] James Dixon, "A World Program for Health Manpower," *The Journal of Medical Education,* XLI, No. 2 (February, 1966), 117.

[31] Weil and Parrish, *loc. cit.,* p. 657.

[32] *Ibid.,* p. 655.

9. Is course work presently available in the college or university's curriculum pertinent to this program?
10. Is there a need to add a large number of special courses to develope this new program?
11. Do the medical center and its affiliated institutions have access to adequate space and clinical material for the program?
12. Are basic science, social science, management, and the pertinent medical and clinical departments interested in undertaking the program?
13. Is there an opportunity for the students and faculty to undertake research?
14. Is there an opportunity for the faculty to be involved in continuing education and community service projects?
15. Is there assistance available from the professional society and the accrediting group in developing the program?
16. Is the experience of similar programs in the region favorable?
17. Is the college or university administration ready to pursue this new program or increase the scope of existing medical programs?[33]

Although these enumerated considerations apply principally to the establishment of a school of allied health sciences within an existing educational institution, the implications are noteworthy for a hospital currently engaged in the education of various types of professionals and technicians. In order to maintain accreditation for the program, and continue to produce a high-caliber professional, hospital schools will have to seriously consider affiliation with colleges or universities. It becomes a question, then, of leadership and farsightedness in maintaining an existing program, and projecting it into the future as an on-going and vital educational endeavor.

THE TEAM CONCEPT

Previously, the team concept of health care has been alluded to, with the physician as the team leader, backed up by other allied health professionals and technicians to provide the full range of health services. Within the team itself, the academically educated personnel will necessarily assume the leadership roles. Dr. Coggeshall is especially emphatic in his description of the health team. He notes that the physician simply can not encompass all health knowledge no matter how well educated he is, and hence must assume the position of the most knowledgeable of the team of professionals. He goes on to say that much of the physician's training is inadequate to adapting him to the role of the leader, and that medical education must take note of, and correct this deficiency.[34] One of the primary problems has been the segregation of the education loci in the health sciences. The physician is seldom exposed to the people he must work with until after he has assumed the role of the MD. Earlier exposure as a student would certainly add to the understanding of the functions and abilities and limitations of the nurse or technician or social worker.

The conceptual framework of the health team is not a new idea, but has not been given wide credence within the United States, primarily because we have long been able to be wasteful of our manpower resources. The time has come when the experience of the developing nations with the team approach must be emulated in this nation. In less fortunate nations, the team approach has for many years been practical necessity with the physician standing at the apex of the health care delivery system. Within the last few years, the emergence of the allied health professionals has meant that for each physician in practice there are now twelve to fifteen other persons involved in the health of a patient.[35] It behooves those responsible for health care and the education of health manpower to become aware and thoroughly familiar with the significance of the trends in the delivery of care, and the application of a systems approach from the point of entry into the health science educational system to the point of final contact with a patient.[36]

CURRICULUM

Integration of health sciences education is particularly adapted to the programming of a vastly enriched curriculum. Whereas, due to limitations of scale in recruiting a faculty, and providing additional courses not directly concerned with the students special field of endeavor, the coordinated program can benefit from all the educational resources of the cooperating institutions or faculties. Often, even baccalaureate education is merely a basic B. S. with a concentration in one area augmented by minimal supporting courses. There is no opportunity for more depth, nor is there a chance for cross-fertilization in the learning between the students in the various specialties.[37]

Certain subjects are notably lacking in many programs. Sociology and psychology - - the human behavior social sciences - - are seldom sufficiently emphasized. The need for training in the rudiments of formal organization and management is almost desperate. The sciences need

[33] *Ibid.*, p. 656.

[34] Coggeshall, *op. cit.*, p. 25.

[35] Henry van Zile Hyde (ed.), "Manpower for the World's Health," *The Journal of Medical Education,* XLI No. 9, Part 2 (September, 1966), 273.

[36] Morris Schaeffer and Herman Hilleboe, "Health Manpower Crisis: Cause or Symptom," *American Journal of Public Health,* LVII, No. 1 (January, 1967), 6.

[37] Weil and Parrish, *loc. cit.*, p. 652.

not be limited to basic science, and ignore other possibilities such as chemistry, physics, physiology, pharmacology, anatomy or pathology at any level except the medical school.[38]

In conclusion, the National Commission of Community Health Services may be cited. In the recently published summary of the work of the commission, *Health Is a Community Affair*, it is recommended that:

> To the fullest extent possible, members of the health team should receive their education jointly in order to give each an appreciation of the goals and skills of the other and the practical experience in working together on common problems.[39]

SURVEY OF EDUCATIONAL FACILITIES

MEDICAL EDUCATION

The State of Wisconsin has two accredited schools of medicine: the University of Wisconsin[40] at Madison, and Marquette University at Milwaukee. Together they enroll approximately 735 students. The University of Wisconsin, is, of course, state supported and maintains its own hospital facilities. Marquette University, on the other hand, is privately endowed, and hence is dependent upon less assured resources than the University of Wisconsin. Private institutions, such as Marquette University, must continuously seek additional sources of support in order to combat the effects of rising costs in education, and to prepare for the possibility of future expansion with the growth of enrollments and national needs.

The University of Wisconsin College of Medicine has an enrollment of 341. Associated facilities include University Hospital, Veterans Administration Hospital, Madison General Hospital, Methodist Hospital, St. Mary's Hospital, Mendota State Hospital, and the Wisconsin Diagnostic Center. Other allied health sciences include a school of nursing, school of cancer cytotechnology, occupational therapy, pharmacy, physical therapy, and X-ray technology.

Marquette University School of Medicine has an enrollment of 395. Associated facilities include the Curative Workshop, Milwaukee Children's Hospital, Milwaukee County Hospital and Clinics, Milwaukee County Mental Health Center, Milwaukee Hospital, Milwaukee Psychiatric Hospital, Muirdale Sanatorium, St. Joseph's Hospital, and

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[39] National Commission on Community Health Services, *op. cit.*, p. 98.

[40] Presently plans are underway to develop a medical school at the University of Wisconsin, Green Bay. These plans should receive highest priority in view of need for additional medical schools as expressed by the Commission on Health Manpower, *Report of the National Advisory Commission on Health Manpower I* (Washington: U. S. Government Printing Office, November, 1967), p. 19.

Veteran's Administration Hospital. Other allied health sciences include a school of dentistry, school of nursing, and physical therapy.

DENTAL EDUCATION

The only school of denistry in Wisconsin is at Marquette University. The school utilizes the facilities of the total university.

NURSING EDUCATION

The discussion of the general trends in health sciences education has pointed out the major problems of nursing education. The State of Wisconsin has, at present, six programs in professional nursing leading to an academic degree. In addition to these six baccalaureate programs, and consistent with some of the most current thinking in the field, there is also one associate degree program at the Milwaukee Institute of Technology. Diploma schools still account for most of the programs, and most of the students in Wisconsin. There are nineteen diploma programs based in hospitals in the state. A listing of the baccalaureate and diploma nursing programs is presented in Appendix A.

The closest academic program in professional nursing relative to the Green Bay area is at Marion College of Fond du Lac at Fond du Lac. This is a relatively new program and has not yet produced any significant number of professional nurses. Diploma schools in the area include: Bellin Hospital at Green Bay, Holy Family Hospital at Manitowoc, and Mercy Hospital at Oshkosh. The next closest significant source of trained nurses are the various schools at Madison and Milwaukee. Two of these schools include other programs for health manpower education. Bellin Hospital has a school of x-ray technology, and Mercy Hospital at Oshkosh has a school of x-ray technology, a school of medical technology and a program for the training of nurse anesthetists. Each of these, then, forms a small education core, integrating the training of two or more professional occupations into a single facility. A listing of the allied health sciences programs in hospitals in northeastern Wisconsin appears in Appendix B.

PRACTICAL NURSING EDUCATION

At present, there are nine accredited schools of practical nursing in the State of Wisconsin. A listing of these schools is presented in Appendix C. Each of the schools accepts both men and married women, and the maximum age for beginning training is given as fifty-five years of age. All of the programs are twelve months. The programs are established in the Technical, Vocational, and Adult Schools of the state, with the exception of a single hospital based school of Practical Nursing at Sacred Heart Hospital in Milwaukee.

At the Technical Institute in Green Bay itself, a program is offered. The next closest program would be that offered at the Technical, Vocational, and Adult School at Fond du Lac. Currently, the programs enroll between 550 and 600 each year.

ALLIED HEALTH PROFESSIONS EDUCATION

Wisconsin has been fortunate in the numbers of programs in the allied health sciences which have been established within the state. These represent a continuing source of manpower for the hospitals of the state and the areas in which the various programs are located. The programs are located either in universities or hospitals depending upon the type of program. The following is an enumeration of the types of programs, the locus of education, and the number of each program type. A listing of these programs, by location, is presented in Appendix D.

Cytotechnology: Academic	2
Medical Records: Hospital	1
Medical Technology: Hospital	32
Nurse Anesthetist: Hospital	4
Occupational Therapy: Academic	2
Pharmacy: Academic	1
Physical Therapy: Academic	2
X-ray Technology: Academic	1
Hospital	26

The major sources of manpower identified above are present in the State of Wisconsin. Within the area of Green Bay, there are programs in: medical technology, nurse anesthesia, and x-ray technology. Cytotechnologists, occupational therapists, dentists, pharmacists, and physical therapists are trained at either Milwaukee or Madison, indicating a dependence upon academically based programs in these more complicated professions and subprofessions.

GENERAL EDUCATIONAL FACILITIES

COLLEGES AND UNIVERSITIES

Similar to most states, the primary source of manpower in the health sciences has been the state university in the State of Wisconsin. The state has also been fortunate to include another privately controlled university engaged in training a significant number of professionals, including physicians. Even though the training of health manpower has recently become more common at other schools, both state owned and privately controlled, the University of Wisconsin and Marquette University remain the primary sources of well-trained manpower.

The State of Wisconsin also maintains a system of state institutions of higher learning located at several points around the state. The closest of these schools to Green Bay being at Oshkosh and Stevens Point, respectively. To the present time, they have not been involved in the education of health sciences personnel, but it would appear that present expansions will eventually enable some of them to engage in the instruction of programs in the health sciences.

A large group, but of little consequence to this point, is the system of County Teachers Colleges. Most of these are extremely small and have not been engaged in any education for health. Such teachers schools exist in Marinette, Manitowoc, Door, Kewaunee, and Waushara Counties in the area of Green Bay. It should not be anticipated that any of these colleges as currently constituted will be establishing programs in the health sciences.

Wisconsin is also endowed with a number of private colleges of varying size and academic standing. There are approximately twenty-five four year privately controlled institutions of higher learning in the state. In the area of Green Bay, there are not a great many colleges. Presently, there are: Lakeland College at Sheboygan; Lawrence University at Appleton; Marian College of Fond du Lac at Fond du Lac; Ripon College at Ripon; and St. Norbert College at West De Pere. With the exception of Marian College of Fond du Lac, none of these schools is presently engaged in the education of health personnel, nor does it appear that such a commitment will be forthcoming. For a complete listing of colleges and universities in the State of Wisconsin see Appendix E.

The establishment of new academic programs in the allied health sciences will most probably be the responsibility of the schools with the largest financial base; in other words, the state supported institutions. Much of the impetus for the removal of the existing programs from a restricted educational setting in the hospital to a joint hospital-academic locus will have to come from the hospitals, and only those which are determined to up-grade their own present programs by making possible the opportunity to acquire an academic degree through affiliation with acceptable institutions of higher learning.

VOCATIONAL, TECHNICAL, AND ADULT EDUCATION

A relatively recent factor in the institutional mix of post-high school education in the State of Wisconsin has been the introduction of the vocational, technical, and adult schools. Presently, there are nine operating under the designation Technical Institutes, 32 Technical, Vocational, and Adult Schools, and 21 Vocational Evening Schools in the state. These schools have, further, been committed to the training of practical nurses, including the schools established at Green Bay and Fond du Lac. Figure 6-1 shows the location of these schools. A listing is presented in Appendix F.

While these technical schools are a relatively new phenomenon in education, generally they hold substantial promise of providing a broader educational base for the personnel they train. The current expansion very definitely meets a perceived gap in the provision of educational opportunities for various segments of the population, and the significance of providing for the education of an increasingly important segment of the health care team goes without saying. The possibility of utilizing these institutions in conjunction with the subprofessional training of personnel traditionally educated only within the hospital is intriguing not only as a means of alleviating shortages of health manpower, but as a vector for the strengthening of the intellectual backgrounds of the persons trained in them.

SUMMARY

The expansion of the categories of health manpower has placed a great burden upon educational institutions. The institution must not only provide health personnel in sufficient quantities but also integrate and coordinate the education and training of all categories.

The increasing demand for physicians has in recent years outstriped their production. Consequently many foreign trained physicians (3,300 annually) enter medical practice in the United States. Still, it was estimated in 1960, that there existed a need for twenty to twenty-four new schools of medicine. While some are in the process of being established efforts to provide the necessary physicians are still insufficient.

The nurse, traditionally educated in the hospital, is increasingly turning to the college or university for her education. While desirable for quality control, the great need for nurses will continue to require the large community hospital to educate a substantial percentage of RN's. However, the need to establish close relationships between the academic institution and the hospital can not be denied. The emphasis must be placed on the award of the academic degree.

Schools of allied health professionals are today a patchwork of varying requirements and legal restrictions. The institution which might coordinate the education of these professions, the university, has not been sufficiently involved. The leadership role of the university with appropriate assistance from junior colleges and vocational-technical schools would provide the vehicle for greater integration; the role of the hospital would then logically be in the arena of clinical experience.

A comprehensive program is thus needed. Its implementation will constitute a necessary prerequisite for the newly evolving team training concept. A concept which is currently believed to be necessary if the patient is to be the recipient of the current state of medical practice; no one health professional can encompass all medical knowledge. Of course the integration of health sciences education must be adopted if the team concept is to be successfully implemented.

The State of Wisconsin has two accredited schools of medicine; the University of Wisconsin at Madison and Marquette University at Milwaukee with a combined enrollment of approximately 735 students. Marquette University also has a school of dentistry. There are six baccalaureate programs in nursing and one associate degree program. Nineteen hospitals have diploma schools which still provide the majority of nurses in the state. Nine accredited schools of practical nursing exist, all of which are twelve month programs. Finally, the state has a number of allied health sciences programs; some located in universities and others in hospitals depending upon the type of program.

Within the context of Wisconsin's educational system, the University of Wisconsin and Marquette University remain as the primary sources of well-trained manpower. However, the recent introduction of the vocational-technical and adult schools should provide a welcome addition in the training and education of health personnel. These schools, currently committed to the training of LPN's, hold substantial promise for playing an increasingly important role in the education of additional members of the health care team. These institutions could and should become a means of strengthening the intellectual development of the subprofessional traditionally educated and trained in the hospital.

SECTION III

FUTURE MANPOWER NEEDS

Having examined the relevant elements of manpower need determination in Section II, the scope of the analysis must now be expanded to encompass the more dynamic aspects of these elements. Accordingly, Chapters VII and VIII are specifically designed to accomplish this task.

Chapter VII will focus on those factors effecting changing future levels of need and effective demand, and will, to the extent possible, project the magnitude and direction of future changes in these factors in the Green Bay area. Chapter VIII will then project the accompanying future need for health manpower in the Green Bay service area.

With the fulfillment of present objectives, the analysis will then turn to future manpower sources by focusing on the nature of the projected demand for health educational facilities. These facilities must be prepared to play the major role in providing for the expanding need for all categories of health manpower.

CHAPTER VII

FACTORS OF NEED AND EFFECTIVE DEMAND

INTRODUCTION

In Chapter IV national disease incidence and prevalence data and national and regional utilization data were used to quantify the meaningful, but elusive concepts of need and effective demand for health services in the Green Bay service area. Although concerned only with the levels of need and effective demand at a particular point in time - - the present - - it was suggested in Chapter IV that such levels are in a constant state of flux; a result of the simultaneous and continuous convergence of relevant variables.

Consistent with the study objectives, the focal point of attention now shifts from the present to the future. Accordingly, the scope of the examination must now be expanded to encompass the determinants of future change - - those epidemiological and socio-economic variables effecting changing levels of future need and effective demand.

FACTORS OF NEED

Of the many factors effecting a changing disease pattern for an area, and thus a changing level of need, the more significant are: (1) the disease entities affecting the population; (2) the distribution of disease entities among the population; (3) the temporal aspects of disease occurrence; and (4) the geographical aspects of disease occurrence.[1] Of these four factors, the first two are clearly the most significant determinants of change. Temporal and geographic factors do effect change slowly, but are not highly significant factors of change during any reasonable period of analysis. For example, seasonal variations in disease occurrence and the urban-rural distribution of disease occurrence normally change slowly in an area, if they change at all, and thus are significant only in projecting distant future change in the disease pattern of the area. Knowledge of the kinds of disease that affect the population, and the segments of the population most affected by any particular disease, however, can be meaningfully employed in projecting future changes in the disease pattern for an area. These variables will therefore be used to project future levels of need for health treatment and care in the Green Bay service area.

Disease entities prevalent in the Green Bay service area have already been discussed in Chapter IV where, it will be recalled that the range of disease that affects the service area population, and the frequency of disease occurrence were examined. Additionally, knowledge of those segments of the service area population affected by different diseases was also uncovered in Chapter IV. This chapter, in pursuit of the present objectives, will further examine the nature of this relationship between disease and population in the Green Bay service area. It will pursue the observation that "the characteristics of the population influence the pattern of disease amongst it, and that the disease pattern itself influences the size, distribution, and composition of the population."[2]

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[1] Ian Taylor and John Knowelden, *Principles of Epidemiology*, p. 5.

DEMOGRAPHIC CHARACTERISTICS

As a measure of changing levels of need, demographic characteristics can be a vital tool of analysis. By comparing and contrasting past trends with present conditions it is possible to extrapolate conditions of the future. The analysis which follows will, in assessing this demographic effect, focus on population size, population composition, and, of direct importance in predicting future levels of need, population growth patterns.

POPULATION SIZE

The primary determinants of population size are the number of births, the number of deaths, and the number of immigrants or emmigrants. By far the most important of the variables are the number of births and deaths which together give the natural increase of the population.

Table 7-1 presents data for selected years 1954, 1957, 1960, 1963, and 1964 indicating the natural increase in the Green Bay community. As can be seen the number of births increased through 1960 and then began to decline during the next four year period. This pattern of decline is consistent with the national trend which exhibited a decline in the birth rate from 1957 to 1964.[3] The second variable, number of deaths, appears to exhibit a somewhat inconsistent pattern. For the years 1954 through 1960, the number of deaths declined systematically. However, in 1963 the number of deaths increased and data for 1964 does not indicate a marked departure from this trend.

Table 7-2 presents data concerned with the net migration of Brown County for the 1950-1960 year period. As can be ascertained from the table, the total net migration over the period of analysis was in total 2,860 or approximately 286 persons per year. One interesting observation, however was the decline of persons in the 20-24 age category.

The net result of the interaction of these three variables indicates a positive addition to the Brown County population. Although, as Table 7-1 illustrates, the natural increase for the years 1963 and 1964 was below the levels of 1957 and 1960.

[2] *Ibid.*, p. 6.

[3] U. S., Bureau of the Census, *Statistical Abstract of the United States*, p. 47.

TABLE 7-1

NATURAL INCREASE FOR BROWN COUNTY, 1954, 1957 1960, 1963, 1964[a]

	1954	1957	1960	1963	1964
Births	3,872	4,136	4,264	4,066	4,050
Deaths	1,142	1,122	1,151	1,213	1,209
Net Increase	2,630	3,014	3,113	2,853	2,841

[a] Source: U.S. Department of Commerce, Bureau of the Census, Census of the United States: 1960.

TABLE 7-2

NET MIGRATION FOR BROWN COUNTY, 1950-1960[a]

Age	Total	Male	Female
All	2,860	1,341	1,519
0-4	265	148	117
5-9	813	421	392
10-14	212	90	122
15-19	493	320	172
20-24	-355	-293	-62
25-29	38	21	17
30-34	330	147	183
35-39	322	121	201
40-44	283	153	130
45-49	138	43	95
50-54	-44	-19	-25
55-59	134	77	58
60-64	87	34	54
65-69	33	37	-5
70-74	-3	22	-26
75+	116	19	97

[a] Source: U.S. Department of Agriculture, Net Migration: Population 1950-1960.

POPULATION COMPOSITION

Due primarily to the natural increase of births over deaths, the population of Brown County has increased 41.9 percent over the past twenty years. Concurrent with the increase has been a substantial change in the composition of the population. Table 7-3 provides data indicating various changes in the age distribution of the Brown County population between the years 1940, 1950, and 1960. Perhaps the most noticeable result of the dynamic change has been the relative increase at both ends of the age-cohort continuum. In 1960 these two groups represented 49 percent of the total population.[4] In 1940 and 1950 the groups comprised respectively only 40.5 and 43.2 percent of the population.[5] A closer examination reveals that for the ages under 18 and increase of 79.9 percent has occurred; and for the ages over 65, a 94 percent increase has occurred.[6] In addition, Table 7-3 indicates that the percentage of females in the child-bearing ages has declined during the past twenty years.

POPULATION GROWTH

The past changes in population size and population composition are reflected in the growth of the population of Brown County. Assuming that the trends will continue in the same direction, and assuming that the trends for Brown County coincide with the service area trends, the size of the Green Bay service area population can be projected to the years 1970, 1975, 1980, and 1985.

Several methods may be used in projecting population statistics. The method employed in this study will be the arithmetic population projection method. Based on the assumption that the annual future population increase or decrease will clearly reflect past population increases or decreases, the method usually yields an accurate estimate of future population growth.

Basically, the procedure involves the computation of the population change between two known periods. This rate is converted to a yearly growth rate and is then utilized to project future population totals. (For a more systematic and detailed analysis of the projection methodology, see Appendix G.

The low population projections are based on the average yearly increase of 1.83 percent from 1940-1950, and the high projections are based on the average yearly increase of 2.72 for 1950-1960. The mean population projections represent the average yearly increase of 2.53 percent during the entire 1940-1960 period. These rates of increase are

[4] Hartman, *op. cit.*

[5] *Ibid.*

[6] *Ibid.*

TABLE 7-3

BROWN COUNTY POPULATION BY AGE AND SEX, 1940, 1950, 1960[a]

Age	Total	%	Male	%	Female	%
			1940			
-6	9,091	10.9	4,652	11.1	4,439	10.8
6-16	15,940	19.2	8,152	19.5	7,788	18.9
17-24	12,561	15.1	6,221	14.9	6,340	15.4
25-44	24,897	30.0	12,487	29.9	12,410	30.1
45-64	15,365	18.5	7,719	18.5	7,646	18.5
65+	5,255	6.3	2,597	6.2	2,658	6.4
Total	83,109	100.0	41,828	100.0	41,281	100.0
			1950			
-6	14,390	14.5	7,354	15.0	7,036	14.3
6-16	17,804	18.0	9,057	18.3	8,745	17.8
17-24	12,561	12.6	6,613	13.5	5,948	12.1
25-44	28,183	28.4	13,915	28.2	14,268	29.0
45-64	18,710	19.0	9,319	19.0	9,391	19.0
65+	7,457	7.5	3,585	7.1	3,872	7.8
Total	98,314	100.0	49,054	100.0	49,260	100.0
			1960			
-6	20,616	16.5	10,529	17.0	10,087	16.0
6-16	29,431	23.5	14,982	24.2	14,449	22.9
17-24	11,846	9.5	5,867	9.5	5,979	9.5
25-44	30,336	24.3	14,867	24.0	15,469	24.5
45-64	22,658	18.1	11,129	18.0	11,529	18.2
65+	10,195	8.1	4,561	7.4	5,634	8.9
Total	125,082	100.0	61,935	100.0	63,147	100.0

[a] Source: U.S., Bureau of the Census, U.S. Census of Population: 1960, 1950, 1940.

based upon the population of Brown County. Because Brown County comprises approximately 91 percent of the total service area, it is thought that trends for both areas will be quite similar. Thus, the average annual rates for Brown County were applied to a base population of the service area.[7] Table 7-4 presents the projections for the total service area. As can be seen the relative small difference between the low and high projections is indicative of a fairly constant rate of population growth.

Because of the dynamic nature of the service area population, a projection for the individual age cohorts will be useful. It is important to realize that the various levels of need are in part determined by the age of the population.

The method utilized in this particular projection differs slightly from that procedure employed above in that the percentages of the individual cohorts are projected. These results were obtained from a projection of the percentage each age group represents of the total population. The change in these percentages was projected for 1970, 1975, 1980, 1985. From these various projections the absolute totals were obtained by applying the results to the service area population projections. (See Table 7-4.)[8]

The projected figures for the age cohorts appear in Table 7-5. The trends observed for the county data are also apparent in these projections. It can be seen that the younger and older segments of the population are expected to continue to expand.

FACTORS OF EFFECTIVE DEMAND

Whereas the future need for health services is a factor of the relationship between disease and the size and composition of the population served, future effective demand ("the amount of service a population is willing and able to buy and pay for")[9] is also dependent upon the future purchasing power of the population of the service area. Thus, it becomes essential that an analysis of indices of the economic health of the area be undertaken. If the service area has a good economic base and potentialities for future growth, the assumption that health care need will be transformed into health care consumption is reasonable.

This analysis will entail a determination of the type of economic activity which are of particular importance to Brown County. The mode to be utilized will involve an inspection of employment trends

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[7] The base population was obtained from the 1966 Wisconsin State Plan.

[8] For a more systematic explanation of the procedure employed, see Appendix G.

[9] Sigmund S. Freedman, "Community Planning for Hospitals," *Hospital Topics*, May, 1961, p. 44.

TABLE 7-4

POPULATION TOTAL IN BROWN COUNTY FOR 1940, 1950, 1960, POPULATION TOTAL FOR GREEN BAY SERVICE AREA FOR 1965, AND PROJECTIONS FOR 1970, 1975, 1980, 1985

Year	High	% Increase/ Year	Low	% Increase/ Year	Mean	% Increase/ Year
1940[a]	--	--	--	--	83,109	--
1950[a]	--	--	--	--	98,314	1.83
1960[a]	--	--	--	--	125,082	2.72
1965[b]	150,770	--	150,770	--	150,770	--
1970[b]	171,275	2.72	164,566	1.83	169,843	2.53
1975[b]	194,569	2.72	179,624	1.83	191,328	2.53
1980[b]	221,031	2.72	196,060	1.83	215,531	2.53
1985[b]	251,091	2.72	214,000	1.83	242,786	2.53

[a] The population figures represent county data.

[b] The population figures represent service area projections.

and totals for industries in the county in comparison to state, regional, and national figures. Additionally, unemployment percentages will be noted as an indication of the general economic health of the community.

Second, selected indices of wealth and income will be presented. These indices will also be analyzed, where possible both historically and spatially; historically by analyzing trends through time, and spatially by comparing county data with that for the state, region, and nation.

EMPLOYMENT – – UNEMPLOYMENT

Table 7-6 presents an excellent summary comparison of the growth rates in nonagricultural employment for states, regions and the nation. It should be noted that Wisconsin has grown at almost the identical rate as has the nation. Assigning the employment totals in the United States during the base period 1957-1959 an index number of 100, the nation's employment index in 1966 was 121.6, while Wisconsin's index figure was 121.9. The entire East North Central region's index was slightly lower at 118.0. The slightly slower growth rate for the region is undoubtedly due in part to the high employment totals during the base period, thus making the maintenance of a high growth rate difficult.

TABLE 7-5

POPULATION PROJECTIONS FOR GREEN BAY SERVICE AREA
BY AGE AND SEX, 1965, 1970, 1975, 1980, 1985

	1965			1970		
Age	Total	Male	Female	Total	Male	Female
-6	24,877	12,687	12,190	32,270	16,458	15,812
6-16	35,431	18,070	17,361	42,291	21,568	20,732
17-24	14,324	7,090	7,234	12,229	6,053	6,176
25-44	36,637	17,952	18,685	38,045	18,642	19,403
45-64	27,289	13,399	13,890	30,062	14,760	15,302
65+	12,212	5,459	6,753	14,946	6,680	8,266
Total	150,770	74,657	76,113	169,843	84,161	85,682

	1975			1980		
Age	Total	Male	Female	Total	Male	Female
-6	41,518	21,174	20,344	52,590	26,348	26,242
6-16	49,937	25,468	24,469	58,193	29,678	28,515
17-24	10,331	5,114	5,217	8,406	4,161	4,245
25-44	39,031	19,125	19,906	39,658	19,432	20,226
45-64	32,717	16,064	16,653	35,347	17,355	17,992
65+	17,794	7,954	9,840	21,337	9,538	11,799
Total	191,328	94,899	96,429	215,531	106,512	109,019

	1985		
Age	Total	Male	Female
-6	66,037	33,613	32,424
6-16	67,252	34,299	32,953
17-24	7,041	3,485	3,556
25-44	39,817	19,510	20,307
45-64	37,632	18,477	19,155
65+	25,007	11,178	13,829
Total	242,786	120,562	122,224

TABLE 7-6

INDEXES OF EMPLOYMENT ON NONAGRICULTURAL PAYROLLS FOR THE NATION, REGIONS, AND STATES, 1939-1966[a]

1957-59=100

Region and State	1966	1965	1964	1963	1962	1961	1960	1955	1950	1945	1940	1939
NATION[1]	121.6	115.7	111.1	108.0	105.8	102.9	103.3	96.5	86.1	76.9	61.6	58.3
NORTH EAST	112.5	108.4	105.1	103.3	102.9	101.0	101.4	97.9	92.4	86.9	73.1	69.3
New England	116.0	110.8	107.1	105.6	105.1	103.0	102.5	98.3	92.7	86.2	75.5	72.2
Maine	113.3	108.5	104.9	102.9	103.0	102.2	102.4	101.6	93.7	95.3	79.9	78.4
New Hampshire	122.4	115.0	110.9	108.7	108.3	105.2	106.6	97.1	89.1	78.0	77.9	77.3
Vermont	122.4	113.9	106.6	104.7	103.8	100.9	101.6	97.0	92.0	86.0	74.2	71.0
Massachusetts	112.5	108.4	105.5	104.8	104.8	103.2	102.6	97.7	94.6	88.5	76.7	73.7
Rhode Island	116.3	112.1	107.5	105.5	105.5	103.2	103.2	104.4	105.6	98.8	89.0	86.3
Connecticut	121.8	114.7	110.2	107.8	105.7	102.8	102.0	97.3	85.2	76.6	67.2	62.2
Middle Atlantic	111.5	107.6	104.4	102.6	102.2	100.3	101.0	97.8	92.3	84.5	72.4	68.5
New York	110.0	106.7	104.2	102.7	102.5	100.8	101.2	96.8	91.2	82.8	70.8	67.6
New Jersey	120.6	115.7	111.2	109.2	107.5	106.3	103.4	95.7	85.0	80.7	67.4	63.9
Pennsylvania	109.2	105.0	101.2	99.0	99.1	97.5	99.6	100.5	97.7	89.4	77.6	72.4
NORTH CENTRAL	118.4	112.6	107.5	104.5	102.6	100.2	102.0	100.2	90.6	79.0	64.3	60.9
East North Central[2]	118.0	112.2	106.8	103.7	101.8	99.2	101.6	101.3	91.3	79.8	64.9	60.8
Ohio	113.2	107.7	103.1	100.9	99.4	97.7	101.0	100.4	88.5	77.6	61.2	57.2
Indiana[2]	124.8	117.7	111.3	108.1	105.4	101.6	103.3	100.1	92.5	80.0	63.6	59.4
Illinois	116.7	110.7	105.9	103.1	101.9	99.9	100.9	97.7	90.5	81.8	69.5	65.8
Michigan[2]	120.5	115.1	108.3	103.8	100.6	96.7	101.1	110.9	96.4	80.4	66.1	60.3
Wisconsin	121.9	116.4	111.1	107.8	105.5	103.1	104.2	96.8	89.3	78.4	60.7	58.3
West North Central	119.4	113.7	109.4	106.8	105.0	102.9	103.1	96.9	88.7	76.8	62.6	61.1
Minnesota	124.1	117.6	111.8	109.0	107.1	104.1	106.3	95.9	87.3	73.7	60.0	59.1
Iowa	122.6	114.6	109.4	106.5	104.3	103.2	103.4	96.1	92.6	77.5	67.3	65.5
Missouri	117.2	112.0	107.4	104.7	102.6	100.7	102.0	97.6	89.9	80.0	65.5	63.4
North Dakota	119.6	117.5	114.7	109.9	105.6	102.1	102.0	93.5	87.8	65.3	59.9	58.0
South Dakota	114.7	113.6	112.4	113.0	113.2	109.4	105.5	95.6	88.4	70.4	65.8	63.5
Nebraska	119.7	115.3	112.6	110.5	109.1	107.4	105.7	98.4	88.5	78.9	61.2	61.3
Kansas	113.7	108.2	105.9	103.5	103.4	101.6	101.0	98.3	83.8	76.1	55.5	53.5
SOUTH	128.8	121.7	115.8	111.6	108.0	104.3	103.7	93.4	81.2	70.3	54.9	52.0
South Atlantic	131.0	124.1	117.9	113.5	109.6	105.6	104.7	92.8	80.8	70.7	56.7	53.2
Delaware	127.0	121.5	112.5	107.9	103.0	100.3	101.5	94.8	79.5	64.3	54.3	49.9
Maryland	130.2	121.7	116.2	112.4	108.9	104.5	102.9	95.9	82.2	74.8	60.8	56.4
District of Columbia	123.8	119.3	115.6	113.0	109.6	105.9	103.5	97.2	96.2	94.1	70.1	64.5
Virginia	131.1	124.4	118.7	116.7	110.4	105.6	103.8	93.1	82.2	74.3	58.6	55.1
West Virginia	102.3	99.0	95.8	93.5	93.0	93.1	95.6	99.8	108.9	95.6	83.0	77.6
North Carolina	133.5	126.8	120.2	115.5	111.9	107.5	106.3	94.2	82.5	67.5	58.1	55.4
South Carolina	132.9	124.2	117.9	114.1	110.4	106.2	105.4	96.5	83.5	71.7	59.5	56.1
Georgia	131.6	125.0	118.0	113.3	108.7	104.5	104.5	95.4	80.2	72.1	55.0	52.4
Florida	142.7	134.5	126.8	120.2	115.3	110.8	109.7	80.2	58.5	46.7	35.3	32.4
East South Central	128.6	121.1	116.9	110.9	107.1	103.5	103.3	95.3	84.1	74.7	57.5	56.9
Kentucky	123.7	117.3	111.7	108.8	104.3	100.3	101.1	96.0	86.1	72.2	62.2	59.2
Tennessee	133.6	124.4	117.5	112.7	109.0	105.0	104.0	97.5	85.4	76.7	55.5	53.4
Alabama	123.3	117.4	111.9	107.8	105.0	102.8	103.0	93.2	82.2	76.8	56.7	53.8
Mississippi	136.0	127.1	120.4	116.2	111.5	107.0	105.8	92.7	81.6	70.2	55.8	53.2
West South Central	125.3	118.3	112.9	108.9	105.9	102.8	102.4	93.2	79.9	67.5	50.2	48.2
Arkansas	140.4	131.3	123.7	119.6	114.4	108.4	105.9	92.6	86.0	78.7	58.0	57.1
Louisiana	121.7	114.4	108.1	103.2	100.5	98.6	99.8	91.7	80.4	68.3	54.9	51.8
Oklahoma	120.6	114.7	110.5	108.2	106.5	103.9	103.0	97.5	86.4	75.1	58.8	57.7
Texas	125.4	118.5	113.5	109.4	106.3	103.1	102.6	92.8	77.8	64.0	45.6	43.6
WEST[3]	131.3	124.6	119.7	116.4	113.0	108.3	106.2	90.1	73.6	66.8	46.0	43.3
Mountain	131.4	125.4	121.6	119.2	115.7	111.3	108.2	88.8	73.7	59.9	48.1	46.2
Montana	113.0	110.5	107.4	106.4	106.6	101.8	101.6	98.8	90.8	71.0	70.0	66.7
Idaho	121.9	117.5	111.5	108.9	108.9	105.2	102.6	91.6	87.0	68.0	58.7	55.8
Wyoming	109.2	108.7	108.8	107.8	106.3	107.7	108.2	95.4	89.5	72.4	61.8	60.5
Colorado	130.2	123.5	120.2	118.0	115.1	112.3	107.8	90.5	74.9	61.4	49.4	48.4
New Mexico	122.8	118.5	115.4	112.2	109.5	106.6	106.6	82.5	68.4	47.8	37.8	35.9
Arizona	148.9	139.4	134.4	130.3	126.0	119.9	115.3	78.1	55.8	47.2	34.8	33.0
Utah	129.8	122.3	119.6	119.8	116.8	111.4	107.7	91.6	77.3	60.8	47.0	44.9
Nevada	177.2	173.2	164.2	157.3	139.3	120.7	113.8	93.0	59.2	53.1	41.1	38.3
Pacific[3]	131.3	123.6	119.1	115.6	112.2	107.4	105.6	90.5	73.6	68.9	45.4	42.5
Washington	123.1	111.8	106.6	106.1	106.8	102.1	101.3	95.8	85.3	88.1	58.0	53.7
Oregon	131.5	125.4	118.3	113.3	109.0	105.1	105.1	98.2	90.4	79.5	56.4	53.4
California	132.7	125.5	121.4	117.5	113.4	108.6	106.4	88.8	69.8	64.4	42.0	39.4

[1] National total includes Alaska and Hawaii beginning 1959.

[2] For purposes of comparability, original data for Michigan adjusted prior to 1958 and Indiana prior to 1959.

[3] Alaska and Hawaii excluded.

[a]Source: U. S., Bureau of Labor Statistics, Employment and Earnings for State and Area 1939-65, Bulletin No. 1370-3 (Washington: U. S. Government Printing Office, 1965).

A better perspective of employment conditions for the immediate service area would be provided by an inspection of shifts in employment totals for not only the state, region, and nation, but also Brown County. Table 7-7 provides data for the 1940-1950 and 1950-1960 year periods. The table indicates the growth in employment that can be attributed to national growth, industrial mix, and regional share. National growth is self-explanatory, however, further comment explaining industry mix and regional share is necessary.

> The technique to be used here is built on the assumption that it is necessary to know two basic facts regarding the growth situation: First, does the region have a rapid or a slow-growth industrial mix or distribution of industries; and, second, does it have an increasing or a decreasing regional share in this industrial distribution. Regarding the first point - - the rate of growth of a particular industry is characterized as rapid if it exceeds and slow if it falls short of the growth rate of all national industries combined over the same period. As for the second point - - the rate of growth of a region within a particular industry is characterized as rapid if it exceeds and slow if it falls short of the growth rate of that industry nationally.[10]

Thus Table 7-7 indicates that employment totals for Brown County have grown at a more rapid rate than has the Great Lakes Region. This is indicated in that the components of employment change related to regional share were positive for both the 1940-1950 and 1950-1960 year periods. (See Columns F and L of Table 7-7 for Brown County.) Additionally, the employment growth rate for Brown County was reflected during the 1940-1950 year period in Wisconsin; however, during the 1950-1960 period, a negative figure indicates the state did not maintain its regional share. The Great Lakes region did not maintain its regional share during either of the two time periods.

Components of employment change related to industrial mix are identified by a positive sign for those industries within the area which grew at a faster rate than the average of all industries and by a negative sign if the industry grew less rapidly. (See Columns E and K.) Thus, employment in agriculture, private households, railroads and railway express has dropped drastically in relation to other industries during the 1940 - 1960 year period. Contract construction while growing during the 1940 - 1950 period has since also declined in relative importance. These declines were mirrored in similar trends throughout the country. In contrast, service industries and manufacturing (particularly electrical manufacturing) exhibited substantial growth rates during the twenty year period in Brown County as have these industries throughout the

[10] U. S. Department of Commerce, *Growth Patterns in Employment by County: 1940 - 1950 and 1950 - 1960. Rocky Mountain,* Vol. VII (Washington: U. S. Government Printing Office, 1965), p. 82.

TABLE 7-7

EMPLOYMENT AND COMPONENTS OF EMPLOYMENT CHANGE[a]

United States

Industry	Employment in			Components of Employment Change									
				1940-1950					1950-1960				
				Changes related to			Total Change	Octant code	Changes related to			Total change	Octant code
	1940 (A)	1950 (B)	1960 (C)	National growth (D)	Industrial mix (E)	Regional share (F)	(G)	(I)	National growth (J)	Industrial mix (K)	Regional share (L)	(M)	(O)
1 Agriculture	8,430,663	6,917,731	4,296,736	2,247,969	-3,760,901	0	-1,512,932	G	1,070,919	-3,691,914	0	-2,620,995	G
2 Forestry and fisheries	107,756	125,019	93,150	28,732	-11,469	0	17,263	G	19,356	-51,225	0	-31,869	G
3 Mining	918,251	930,657	654,006	244,845	-232,439	0	12,406	G	144,076	-420,727	0	-276,651	G
4 Contract construction	2,068,474	3,457,236	3,815,937	551,542	837,220	0	1,388,762	C	535,217	-176,516	0	358,701	G
5 Food and kindred products mfg	1,105,875	1,414,009	1,822,477	294,873	13,261	0	308,134	C	218,904	189,564	0	408,468	C
6 Textile mill products mfg	1,151,805	1,240,283	954,036	307,120	-218,642	0	88,478	G	192,039	-478,286	0	-286,247	G
7 Apparel mfg	799,288	1,063,921	1,159,163	213,124	51,509	0	264,633	C	164,708	-69,466	0	95,242	G
8 Lumber, wood products, furniture mfg	939,444	1,190,176	1,067,252	250,495	237	0	250,732	C	184,252	-307,176	0	-122,924	G
9 Printing and publishing mfg	632,298	855,294	1,141,192	168,597	54,399	0	222,996	C	132,363	153,535	0	285,898	C
10 Chemicals and allied products mfg	440,142	659,327	904,542	117,360	101,825	0	219,185	C	137,071	108,144	0	245,215	C
11 Electrical and other machinery mfg	1,072,424	2,084,337	3,055,447	285,953	725,960	0	1,011,913	C	322,670	648,440	0	971,110	C
12 Motor vehicles and equipment mfg	574,960	869,388	841,861	153,308	141,120	0	294,428	C	134,591	-162,118	0	-27,527	G
13 Other transportation equipment mfg	307,133	482,799	976,837	81,895	93,771	0	175,666	C	74,742	419,296	0	494,038	C
14 Other and miscellaneous mfg	3,568,091	4,741,439	5,630,279	951,405	221,943	0	1,173,348	C	734,026	154,814	0	888,840	C
15 Railroads and railway express	1,136,885	1,388,042	941,214	303,141	-51,984	0	251,157	G	214,894	-661,722	0	-446,828	G
16 Trucking and warehousing	506,152	702,667	911,454	134,961	61,554	0	196,515	C	108,780	100,007	0	208,787	C
17 Other transportation	542,738	863,521	887,245	144,717	176,066	0	320,783	C	133,062	-109,338	0	23,724	G
18 Communications	394,214	709,829	819,649	105,114	210,501	0	315,615	C	109,751	69	0	109,820	G
19 Utilities and sanitary service	544,401	785,248	898,565	145,160	95,687	0	240,847	C	121,545	-8,228	0	113,317	G
20 Wholesale trade	1,209,448	1,981,827	2,212,984	322,490	449,889	0	772,379	C	306,808	-75,651	0	231,157	G
21 Food and dairy products stores	1,496,749	1,725,917	1,689,688	398,563	-169,395	0	229,168	G	266,891	-303,120	0	-36,229	G
22 Eating and drinking places	1,120,571	1,692,805	1,801,667	298,791	273,443	0	572,234	C	262,088	-153,226	0	108,862	G
23 Other retail trade	3,738,583	5,186,101	6,088,246	996,863	450,655	0	1,447,518	C	802,834	99,311	0	902,145	C
24 Finance, insurance and real estate	1,469,881	1,920,691	2,696,630	391,932	58,878	0	450,810	C	297,344	478,595	0	775,939	C
25 Hotels and other personal services	1,689,516	1,861,590	1,941,552	450,495	-278,421	0	172,074	C	288,194	-208,232	0	79,962	G
26 Private Households	2,336,497	1,639,551	1,916,966	629,008	-1,325,954	0	-696,946	G	253,820	23,595	0	277,415	C
27 Business and repair services	867,413	1,313,235	1,610,728	231,289	214,533	0	445,822	C	203,303	94,190	0	297,493	C
28 Entertainment, recreation services	396,966	494,720	502,879	105,850	-8,096	0	97,754	G	76,580	-68,421	0	8,159	G
29 Medical, other professional services	3,330,562	4,797,215	7,577,846	888,068	578,585	0	1,466,653	C	742,661	2,037,970	0	2,780,631	C
30 Public administration	1,484,586	2,514,357	3,202,890	395,853	633,918	0	1,029,771	C	389,250	299,283	0	688,533	C
31 Armed forces	305,500	1,025,502	1,733,402	81,459	638,543	0	720,002	C	138,739	569,161	0	707,900	C
32 Industry not reported	690,540	842,920	2,608,085	184,527	-32,147	0	152,380	G	130,831	1,634,334	0	1,765,165	C
Total	45,375,815	57,474,912	66,372,649	12,099,097	0	0	12,099,097	I	8,897,735	2	0	8,897,737	I
				Total net relative change (N) (Sum of totals Cols. E and F)			0		Total net relative change (N) (Sum of totals Cols. K and L)			2	

Great Lakes

Industry	Employment in			Components of Employment Change									
				1940-1950					1950-1960				
				Changes related to			Total Change	Octant code	Changes related to			Total change	Octant code
	1940 (A)	1950 (B)	1960 (C)	National growth (D)	Industrial mix (E)	Regional share (F)	(G)	(I)	National growth (J)	Industrial mix (K)	Regional share (L)	(M)	(O)
1 Agriculture	1,233,710	1,050,692	671,502	328,959	-550,355	38,379	-183,017	6	162,658	-566,821	24,971	-379,190	6
2 Forestry and fisheries	6,275	7,587	6,425	1,673	-668	307	1,312	6	1,175	-3,109	772	-1,162	6
3 Mining	113,498	108,137	67,953	30,255	-28,720	-6,896	-5,361	8	16,761	-48,886	-8,059	-40,184	8
4 Contract construction	381,362	595,033	651,729	101,687	154,357	-42,373	213,671	4	92,118	-30,381	-5,041	56,696	8
5 Food and kindred products mfg	278,839	344,707	397,240	74,350	3,344	-11,826	65,868	5	53,364	46,212	-47,043	52,533	5
6 Textile mill products mfg	49,972	46,766	32,985	13,325	-9,486	-7,045	-3,206	8	7,260	-18,033	-2,988	-13,781	8
7 Apparel mfg	101,749	111,447	91,891	27,131	6,557	-23,990	9,698	5	17,253	-7,276	-29,533	-19,556	7
8 Lumber, wood products, furniture mfg	156,424	180,122	160,333	41,709	39	-18,051	23,697	5	27,885	-46,488	-1,186	-19,789	8
9 Printing and publishing mfg	166,481	221,599	284,825	46,391	14,312	-5,585	55,118	4	34,306	39,782	-10,861	63,227	4
10 Chemicals and allied products mfg	89,216	139,667	187,577	23,789	20,640	6,023	50,452	2	21,622	21,849	4,439	47,910	2
11 Electrical and other machinery mfg	467,629	908,200	1,131,936	124,690	316,556	-672	440,572	4	140,599	282,539	-199,402	223,736	4
12 Motor vehicles and equipment mfg	466,620	679,205	621,723	124,420	114,528	-26,364	212,584	4	105,168	-126,656	-35,977	-57,482	8
13 Other transportation equipment mfg	34,935	69,494	133,209	9,315	10,666	14,578	34,559	1	10,759	60,353	-7,397	63,714	4
14 Other and miscellaneous mfg	1,108,630	1,476,545	1,622,482	295,607	68,957	3,351	367,915	2	228,905	48,211	-130,859	145,937	4
15 Railroads and railway express	264,460	320,473	222,928	70,516	-12,092	-2,411	56,013	8	49,613	-152,777	5,619	-97,545	8
16 Trucking and warehousing	119,617	168,659	213,707	30,562	13,939	9,542	54,043	2	26,110	24,004	-5,067	45,047	4
17 Other transportation	92,752	139,929	120,144	24,732	30,089	-7,644	47,177	4	21,663	-17,818	-23,629	-19,784	8
18 Communications	83,680	143,820	154,028	22,313	44,683	-6,856	60,140	4	22,265	-14	-12,043	10,208	7
19 Utilities and sanitary service	117,190	160,861	175,393	31,248	20,598	-8,175	43,671	4	24,903	-1,686	-8,686	14,531	7
20 Wholesale trade	243,372	379,103	407,478	64,893	90,529	-19,691	135,731	4	58,609	-14,471	-15,863	28,275	7
21 Food and dairy products stores	320,048	356,627	342,511	85,358	-36,270	-12,489	36,579	8	55,210	-62,291	-7,035	-14,116	8
22 Eating and drinking places	250,879	361,619	378,989	66,092	61,218	-17,361	110,740	4	55,903	-32,727	-5,805	17,371	8
23 Other retail trade	806,495	1,073,485	1,227,768	215,065	97,216	-45,272	266,989	4	166,187	20,561	-32,465	154,283	5
24 Finance, insurance and real estate	286,039	361,019	483,495	76,270	11,458	-12,748	74,980	5	55,890	89,582	-22,996	122,476	4
25 Hotels and other personal services	327,951	349,439	341,973	87,446	-56,044	-11,913	21,489	8	54,097	-39,081	-22,412	-7,466	8
26 Private Households	348,193	225,443	268,139	92,843	-196,706	-18,889	-122,750	8	34,901	3,244	4,551	42,696	1
27 Business and repair services	186,410	269,646	295,907	49,705	46,104	-12,573	83,236	4	41,744	19,340	-34,823	26,261	5
28 Entertainment, recreation services	75,345	95,135	85,713	20,090	-1,536	1,236	19,790	6	14,728	-13,159	-10,991	-9,422	8
29 Medical, other professional services	666,023	945,278	1,494,276	177,593	115,702	-14,036	279,256	4	146,339	401,576	1,082	548,997	2
30 Public administration	269,264	418,066	504,889	71,707	114,976	-37,871	148,802	4	64,721	49,762	-27,660	86,823	4
31 Armed forces	22,200	58,368	86,324	5,919	46,401	-16,153	36,167	4	9,036	31,255	-12,335	27,956	4
32 Industry not reported	126,603	165,152	537,940	33,758	-5,896	10,685	38,549	1	25,967	320,521	26,699	372,787	2
Total	9,296,812	11,951,323	13,403,412	2,468,296	507,098	-300,861	2,674,513	4	1,847,098	277,109	-652,121	1,472,086	5
				Total net relative change (N) (Sum of totals Cols. E and F)			206,237		Total net relative change (N) (Sum of totals Cols. K and L)			375,012	

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[a] Source: U. S. Department of Commerce, *Growth Patterns in Employment by County: 1940-1950 and 1950-1960, Great Lakes*, Vol. III (Washington: U. S. Government Printing Office)

TABLE 7-7 - - Continued

Wisconsin

Industry	Employment in			Components of Employment Change									
				1940–1950					1950–1960				
				Changes related to			Total Change	Octant code	Changes related to			Total change	Octant code
	1940 (A)	1950 (B)	1960 (C)	National growth (D)	Industrial mix (E)	Regional share (F)	(G)	(I)	National growth (J)	Industrial mix (K)	Regional share (L)	(M)	(O)
1 Agriculture	273,467	251,950	167,196	72,912	-121,984	27,555	-21,517	6	39,001	-135,910	12,155	-84,754	6
2 Forestry and fisheries	1,717	2,256	1,856	458	-103	184	539	5	349	-924	175	-400	6
3 Mining	2,504	3,035	2,824	668	-634	497	531	6	470	-1,372	691	-211	6
4 Contract construction	39,428	66,548	71,717	10,511	15,959	650	27,120	1	10,302	-3,398	-1,736	5,169	8
5 Food and kindred products mfg	38,152	54,737	63,366	10,173	458	5,955	16,586	1	8,474	7,338	-7,183	8,629	4
6 Textile mill products mfg	11,371	10,677	7,133	3,032	-2,159	-1,567	-694	8	1,653	-4,117	-1,080	-3,544	8
7 Apparel mfg	4,912	9,197	8,178	1,310	317	2,659	4,286	1	1,426	-600	-1,842	-1,019	7
8 Lumber, wood products, furniture mfg	27,598	33,653	28,046	7,359	7	-1,311	6,055	5	5,210	-8,686	-2,131	-5,607	8
9 Printing and publishing mfg	14,212	22,102	29,472	3,790	1,222	2,879	7,891	1	3,422	3,968	-19	7,371	4
10 Chemicals and allied products mfg	4,292	6,269	8,034	1,144	993	-160	1,977	4	971	981	-186	1,766	6
11 Electrical and other machinery mfg	51,536	104,023	138,487	13,741	34,885	3,863	52,489	2	16,104	32,361	-14,001	34,464	4
12 Motor vehicles and equipment mfg	17,705	30,115	43,882	4,721	4,346	3,344	12,411	2	4,662	-5,616	14,721	13,767	3
13 Other transportation equipment mfg	2,494	5,577	7,336	665	761	1,657	3,083	1	863	4,843	-3,948	1,758	6
14 Other and miscellaneous mfg	97,961	138,293	149,849	26,121	6,093	8,118	40,332	1	21,409	4,515	-14,369	11,555	5
15 Railroads and railway express	22,592	25,324	16,143	6,024	-1,033	-2,259	2,732	7	3,920	-12,073	-1,029	-9,182	8
16 Trucking and warehousing	10,576	17,076	21,465	2,820	1,206	2,474	6,500	1	2,644	2,430	-685	4,389	6
17 Other transportation	7,072	12,139	10,171	1,886	2,294	887	5,067	2	1,879	-1,546	-2,302	-1,969	7
18 Communications	9,220	14,648	15,716	2,458	4,925	-1,955	5,428	6	2,268	-1	-1,199	1,068	7
19 Utilities and sanitary services	11,319	17,308	18,774	3,018	1,989	982	5,989	2	2,680	-181	-1,033	1,466	7
20 Wholesale trade	24,884	39,530	40,121	6,635	9,276	-1,265	14,646	4	6,120	-1,509	-4,020	591	7
21 Food and dairy products stores	32,328	37,471	38,490	8,620	-3,664	187	5,143	6	5,801	-6,545	1,763	1,019	6
22 Eating and drinking places	28,822	44,016	48,012	7,685	7,033	476	15,194	2	6,814	-3,984	1,166	3,996	6
23 Other retail trade	81,486	112,770	131,427	21,728	9,822	-266	31,284	6	17,458	2,160	-961	18,657	4
24 Finance, insurance and real estate	24,729	32,881	45,199	6,594	991	568	8,153	2	5,090	8,159	-931	12,318	4
25 Hotels and other personal services	30,587	34,129	33,278	8,156	-5,041	427	3,542	6	5,284	-3,818	-2,317	-851	8
26 Private households	38,953	22,295	26,967	10,387	-22,006	-5,039	-16,658	8	3,452	321	899	4,672	1
27 Business and repair services	19,356	30,602	29,261	5,161	4,787	1,298	11,246	2	4,738	2,195	-8,273	-1,340	5
28 Entertainment, recreation services	6,854	10,001	8,623	1,827	-140	1,460	3,147	3	1,548	-1,383	-1,543	-1,378	7
29 Medical, other professional services	79,434	107,603	163,204	21,180	13,799	-6,811	28,168	4	16,658	45,712	-6,769	55,601	4
30 Public administration	30,445	40,938	51,834	8,118	13,000	-10,625	10,493	6	6,338	4,873	-314	10,897	4
31 Armed forces	350	2,363	5,239	93	732	1,188	2,013	1	366	1,265	1,245	2,876	2
32 Industry not reported	14,424	18,136	42,587	3,846	-671	537	3,712	8	2,808	35,190	-13,546	24,452	4
Total	1,060,758	1,357,646	1,473,870	282,843	-22,562	36,607	296,888	3	210,180	-35,344	-58,610	116,226	7
				Total net relative change (H) (Sum of totals Cols. E and F)			14,045		Total net relative change (N) (Sum of totals Cols. K and L)			-93,954	

5 Brown County

Industry	Employment in			Components of Employment Change									
				1940–1950					1950–1960				
				Changes related to			Total Change	Octant code	Changes related to			Total change	Octant code
	1940 (A)	1950 (B)	1960 (C)	National growth (D)	Industrial mix (E)	Regional share (F)	(G)	(I)	National growth (J)	Industrial mix (K)	Regional share (L)	(M)	(O)
1 Agriculture	5,164	4,336	2,765	1,377	-2,304	99	-828	6	671	-2,339	97	-1,571	6
2 Forestry and fisheries	66	83	26	18	-7	6	17	6	13	-34	-36	-57	7
3 Mining	24	30	12	6	-6	6	6	4	5	-14	-9	-18	8
4 Contract construction	1,128	2,086	2,236	301	457	201	959	2	323	-107	-66	150	8
5 Food and kindred products mfg	1,833	2,232	2,312	489	22	-112	399	5	346	299	-565	80	5
6 Textile mill products mfg	10	21	44	3	-2	10	11	3	3	-8	28	23	3
7 Apparel mfg	88	154	216	23	6	37	66	1	24	-10	48	62	3
8 Lumber, wood products, furniture mfg	201	378	402	54	0	123	177	[illegible]	59	-98	63	24	6
9 Printing and publishing mfg	271	508	746	72	23	142	237	1	79	91	67	237	2
10 Chemicals and allied products mfg	62	133	208	17	14	40	71	1	21	21	34	76	1
11 Electrical and other machinery mfg	875	1,425	2,117	233	592	-276	549	4	221	443	28	692	2
12 Motor vehicles and equipment mfg	68	165	78	18	17	62	97	1	26	-31	-82	-87	7
13 Other transportation equipment mfg	14	18	46	4	4	-4	4	8	3	16	10	29	2
14 Other and miscellaneous mfg	2,889	4,412	5,816	770	180	573	1,523	1	683	144	577	1,404	1
15 Railroads and railway express	1,288	1,473	1,164	343	-59	-100	184	7	228	-702	165	-309	6
16 Trucking and warehousing	411	877	1,130	110	50	306	466	1	136	125	-8	253	4
17 Other transportation	265	390	220	71	86	-32	125	4	60	-30	-201	-171	7
18 Communications	283	644	582	75	151	134	360	2	100	0	-162	-62	8
19 Utilities and sanitary services	444	589	706	118	78	-51	145	4	91	-6	32	117	3
20 Wholesale trade	1,238	2,017	1,839	330	461	-12	779	4	312	-77	-413	-178	7
21 Food and dairy products stores	949	1,206	1,197	253	-108	112	257	3	187	-211	15	-9	6
22 Eating and drinking places	947	1,365	1,603	253	231	-66	418	6	211	-124	150	237	3
23 Other retail trade	2,782	4,002	4,712	742	335	143	1,220	2	620	77	14	711	2
24 Finance, insurance and real estate	637	846	1,198	170	26	14	210	2	131	210	11	352	2
25 Hotels and other personal services	837	1,013	1,118	223	-138	91	176	6	157	-113	61	105	6
26 Private households	1,143	631	820	305	-646	-171	-512	8	98	9	82	189	1
27 Business and repair services	650	954	980	173	161	-30	304	4	148	68	-190	26	5
28 Entertainment, recreation services	163	309	305	43	-3	106	146	3	48	-45	-9	-6	8
29 Medical, other professional services	2,287	3,067	4,403	610	397	-227	780	4	475	1,103	-242	1,336	4
30 Public administration	758	1,028	1,431	202	324	-256	270	4	159	122	121	402	2
31 Armed forces	0	66	34	0	0	66	66	4	10	35	-77	-32	5
32 Industry not reported	224	374	1,679	60	-10	101	151	3	58	726	517	1,301	2
Total	27,999	36,833	42,342	7,466	332	1,035	8,833	1	5,706	-278	80	5,508	6
				Total net relative change (H) (Sum of totals Cols. E and F)			1,367		Total net relative change (N) (Sum of totals Cols. K and L)			-198	

United States.

In total, Brown County grew at a more rapid rate during the 1940-1950 period than the nation. The increase in the number employed which could be attributed to national growth would have been 7,466 for Brown County. (See Column D.) However, the total increase in employment was actually 8,833. (See Column G.) The difference of 1,367 employees represents the number of workers who would not have gained employment if the county had grown at the same rate as did the nation.

In contrast during the 1950 - 1960 period, a national growth rate applied to Brown County would have produced 5,706 newly employed whereas 5,508 were actually employed. (See Columns J and L.) This does not represent a significant decline, however, and should not be viewed with alarm.

The antithesis of employment is unemployment. The percentage unemployed is an especially significant indication of the economic health of the community. A low unemployment rate indicates that substantially all of the populace are sharing in the economic growth of the community.

It should be noted that the much lower unemployment rate in Brown County (3.7 compared to 5.1 percent for the entire United States) is particularly significant in view of the opinion of many that 4 percent of the population are hard core unemployed. (See Table 7-8.) Wisconsin also had a very low unemployment rate (3.9 percent) which indicates the surrounding area also enjoyed a low number of unemployed.

TABLE 7-8

PERCENTAGE UNEMPLOYED: 1960[a]

Region	Percent
United States	5.1
East North Central	5.2
Wisconsin	3.9
Brown	3.7

[a]Source: U.S., Bureau of the Census, County and City Data Book: 1962.

Of course, the unemployment percentage for a single year does not constitute conclusive proof that unemployment is not a problem in the county. However, in view of the fact that 1950 - 1960 represented a period of a slightly slower growth rate in employment in Brown County than the nation (see Table 7-7) the continuing low rate of unemployment is noteworthy.

INDICES OF ACCUMULATED WEALTH

The population of a service area has two primary internal sources of funds for expenditures; accumulated wealth and current income. Each provides the individual with funds for current consumption and/or capital investment. Thus, the dollar volume of each becomes of primary importance in an analysis of the economic base of a community. Two indices of accumulated wealth are bank deposits and property valuation.

BANK DEPOSITS

Bank deposits constitute a very liquid asset, and thus can be readily used to purchase goods and services (i. e., health care services). Consequently, an analysis of current income without an inspection of bank deposits would not provide a good index of the funds available for immediate expenditures.

Bank deposits are reported under two category headings; total and time deposits. Total deposits include time and demand deposits, plus interbank and government deposits. Therefore, total deposits are an indication of not only deposits of private citizens and institutions, but also of the deposits of other banks across the country. In contrast, time deposits represent an interest-bearing deposit, and thus, in part, an investment of funds and not a means of accomplishing ease of transfer.

An analysis of Table 7-9 indicates that bank deposits have increased substantially both nationally and for the other selected geographic areas. Since 1950, total bank deposits for the nation have more than doubled in volume increasing from $145,931 million to $331,820 million in 1964. During the same time period, time deposits almost tripled; increasing from $54,932 to $157,202 million. The greater percentage increase in time deposits indicates that the populace has the necessary funds available for cash flow,and thus they are placing a larger percentage of their accumulated wealth into interest-producing time deposits.

Brown County, Wisconsin, and the East North Central region have exhibited similar trends. Although, the rate of increase has generally not been quite as great, it has been substantial. Once again, the more rapid increase in time deposits is a good indication of the substantial economic wealth of the service area and the state.

TABLE 7-9

BANK DEPOSITS (TOTAL AND TIME, $1,000)[a]

	1964	%	1960	%	1956	%	1950
			United States				
Total	331,820,200	33.2	249,146,248	15.6	215,504,211	47.7	145,931,249
Time	157,201,784	59.5	98,572,569	29.1	76,339,409	39.0	54,932,360
			East North Central				
Total	58,645,043	30.5	44,937,337	10.8	40,546,484	47.5	28,173,137
Time	26,210,717	61.4	16,238,094	22.7	13,239,068	31.3	10,083,436
			Wisconsin				
Total	5,602,953	27.8	4,385,837	20.3	3,645,604	33.2	2,736,865
Time	2,718,245	44.0	1,887,109	30.7	1,443,352	17.1	1,232,249
			Brown County				
Total	182,330	41.8	128,589	17.7	109,268	27.5	85,667
Time	105,365	52.7	68,994	24.1	55,574	24.8	44,527

[a]Source: City and County Data Book: 1967, 1962, 1956.

PROPERTY VALUATION

A second indication of the total wealth of the county is its property valuation. The value of total property in 1965 was set at $778,293 thousand, of which Green Bay accounted for $472,545 thousand or 60.7 percent. (See Table 7-10.) All urban communities represented 72.4 percent of the total.

Perhaps the most significant trend indicated by the table has been the great increase in urban property and the very slight increase in rural values, with an actual decline since 1963. This is indicative of the relative decrease in agricultural importance in the county as has occurred throughout the country.

Residential properties represent the single largest category of real estate properties (56.2 percent of the total). (See Table 7-11.) Mercantile and manufacturing properties also account for a substantial degree of total real estate valuations.

Also important is the large percentage of total real estate values which improvements represent. This is indicative of the importance of maintaining the good condition of buildings and other capital investments for property tax roles.

In contrast to bank deposits, property valuation does not represent a liquid asset. It does, however, provide in many cases an economic base upon which to place the more liquid assets (cash and bank deposits) of the populace.

INDICES OF INCOME

As a final indication of the purchasing power of the community, some indices of its current and past levels of income should be included. First, the median level of income provides an indication of the funds from current earnings that would be available for consumption purposes. Second, a more refined estimate, effective buying power, would provide perhaps the best available indication of the volume of goods and service which the consumer could purchase without depleting his accumulated wealth.

MEDIAN INCOME

The *Census of Population* provides data on median income levels for both families and individuals. For example, the 1960 Census provided median income levels for all families in both 1959 and 1949, while also providing a more detailed analysis of the median income in selected professions for 1959. (See Tables 7-12 and 7-13.) In both 1949 and 1959, Brown County enjoyed a higher median income than either the state or the nation. It should additionally be noted that while the growth rate for the county has been somewhat below the state and national levels, the county has been able to maintain a substantially higher level.

TABLE 7-10

PROPERTY VALUATION (BROWN COUNTY)[a]

Property Valuation	1965	% of Total Brown	1963	% of Total Brown	1960	% of Total Brown
Urban	563,245,050	72.4	439,785,090	63.6	416,374,330	66.3
Rural	215,047,550	27.6	251,347,700	36.4	211,437,450	33.7
Property Valuation						
Personal	112,927,000	14.5	102,388,790	14.8	91,417,980	14.6
Real Estate	665,365,600	85.5	588,744,000	85.2	536,393,800	85.4
Property Valuation						
Green Bay	472,544,690	60.7	360,858,800	52.2	348,298,390	55.5
Outside Green Bay	305,747,910	39.3	330,273,990	47.8	279,513,390	44.5
Total Property Brown County	778,292,600	100.0	691,132,790	100.0	627,811,780	100.0

[a] Source: Wisconsin Department of Taxation, Property Tax Bulletin Nos. 465, 463, 460: 1966, 1964, 1961.

TABLE 7-11

BROWN COUNTY REAL ESTATE BY CLASSIFICATION[a]

Real Estate		Percent of Total Real Estate
Land Value	112,549,500	16.9
Improvements	522,816,100	83.1
Residential	373,833,400	56.2
Mercantile	120,118,100	18.1
Manufacturing	118,691,000	17.8
Agricultural	52,108,900	7.8
Swamp and Waste	27,200	.0
Timber	587,000	.1
Total Real Estate	665,365,600	100.0

[a]Source: Wisconsin Department of Taxation, Village and City Taxes 1965, 1963, 1960, Bulletins, 365, 363, 360: 1966, 1964, 1961.

TABLE 7-12

MEDIAN INCOME OF FAMILIES[a]

	1959	%	1949
United States	5,660	84.2	3,073
East North Central	6,215	81.3	3,428
Wisconsin	5,926	82.0	3,256
Brown County	6,016	74.8	3,441

[a]Source: Census of Population: 1960.

The more detailed analysis of Table 7-13 presents additional insights. Of particular significance is the relatively high median income levels of farmers and farm managers. Even though the number of farm employees dropped, those that remain in agriculture in Brown County enjoy a good financial position.

In general, Brown County provides good relative salaries for the unskilled and semi-skilled laborer with the exception of farm laborers. While professionals and managers have not enjoyed the high levels indicated by national levels, this analysis does reaffirm the fact that a majority of the occupation groups in the county enjoy a good income in comparison to individuals in similar occupational categories in other geographically defined areas.

TABLE 7-13

MEDIAN INCOME: 1959 FOR MALES[a]

	Total	Professionals, Management and Kindred	Farmers and Farm Managers	Craftsmen, Foremen, and Kindred Workers	Operatives and Kindred Workers	Farm Laborers, Unpaid and Farm Foremen	Laborers Except Farm and Mine Workers
U.S.	4,595	6,640	2,136	5,240	4,282	1,107	2,940
E.N.C.	5,123	6,963	2,451	5,731	4,892	1,096	3,587
Wis.	4,823	6,536	2,405	5,462	4,828	964	3,638
Brown	5,067	6,521	3,492	5,429	4,973	984	4,057

[a] Source: Census of the Population: 1960.

EFFECTIVE BUYING POWER

Finally, effective buying power is an index developed by *Sales Management,* which attempts to estimate the net dollars which individuals and/or families have available for spending.

To arrive at this figure *Sales Management* totals up its estimates of what individuals receive in the form of wages, salaries, and commissions; proprietors income (self-employed); rental income from real property; dividends and interest from securities and savings; social security benefits; pensions; welfare payments. To this sum

> is added, where pertinent, imputed rentals of owner-occupied homes and imputed value of fuel and food raised and consumed on farm. Subtracted from the total is the estimate for taxes - - federal, state and local. . . . . The end result we call net Effective Buying Income (EBI). It is comparable to what the government calls "disposable personal income."[11]

Table 7-14 provides both 1966 absolute estimates of effective buying power per capita for selected regions and the percentage increase which the 1966 figure represents over selected past years. Brown County currently has a slightly lower per capita figure than does the state, region or nation. However, of importance is the fact that since 1950, the county has grown at a slightly faster pace than has the nation.

Table 7-15 provides the same data except that the figures represent effective buying power per household. It is notable that on a per household basis, Brown County has a higher effective buying power total than either the state or the nation. The citizens of the county obviously average larger households. Additionally, it is significant that the county has again grown at a slightly faster rate than has the nation since 1950, indicating that the county is and should continue to maintain its high net effective buying power per household.

In conclusion, it should be noted that caution should be exercised in interpretation of the table. An analyst in carefully choosing the time period could conceivably arrive at virtually any conclusion he wished. Thus, no attempt will be made to analyze any other specific time period, but only conclude with the observation that the absolute totals and rates of growth for the county generally compare quite favorably with state and national figures.

HEALTH LEGISLATION

In conjunction with the previous discussions of the factors of need and demand, attention is now placed on the federal government and its increasingly larger role in the health arena. Gaining impetus since World War II, the federal government has constantly sought new methods in which the health needs of the nation could be augmented. As President Johnson has repeatedly stated:

> We have made great progress in this country in bringing medical services to all our people. Advances in medical science and our increasing capacity to give better medical care impose a heavy demand for trained people to provide these services. Our examination of the nation's health problem makes clear that the most critical need is in the manpower field.[12]

[11] "Survey of Buying Power," *Sales Management*, June 10, 1966, pp. All,A14.

[12] Lyndon B. Johnson, "Statement by the President Urging Program Adjustments to Meet Needs," *Employment Service Review*, November, 1966, p. 1.

TABLE 7-14

PERCENTAGE INCREASE IN EFFECTIVE BUYING POWER (PER CAPITA)[a]

	1966[b]	1965	1953	1961	1959	1956	1953	1950
United States	2,543	7.4	20.9	29.3	36.3	51.3	63.5	62.4
East North Central	2,781	10.0	24.9	35.3	37.6	48.0	63.4	91.9
Wisconsin	2,462	11.6	21.0	29.9	38.5	51.5	60.2	91.1
Brown County	2,313	11.5	20.7	28.9	35.4	43.8	47.8	71.2

[a] Source: "Survey of Buying Power," Sales Management, June 10, 1966.

[b] The data provided in this column represents the absolute values for 1965.

TABLE 7-15

PERCENTAGE INCREASE IN BUYING POWER (PER HOUSEHOLD)[a]

	1966[b]	1965	1963	1961	1959	1956	1953	1950
United States	8,532	6.8	19.7	28.1	33.6	48.7	64.9	75.6
East North Central	9,357	9.3	23.8	34.3	38.6	49.3	67.5	90.6
Wisconsin	8,418	10.9	19.8	28.7	37.6	47.4	59.6	89.1
Brown County	8,560	10.5	19.4	27.5	37.1	45.6	51.9	77.6

[a] Source: "Survey of Buying Power," Sales Management.

[b] The data provided in this column represents the absolute value for 1965.

In order to promote such activities, Congress has passed numerous pieces of legislation in hopes of limiting the many areas of unmet need. That is, legislation has been implemented to help increase the effective demand of the less affluent members of the "Great Society." Perhaps, two of the more important results of congressional activity is the pasage of Public Law 89-97 (Medicare-Medicaid).

Although the ramifications of Title XIX (Medicaid) remain to be seen, it is unquestionable that many more persons will be able to receive care, and thus reduce unmet need. In addition, Title XVIII has been shown by a recent study to have increased the utilization of patients 65 and over by 19 percent.[13] This, of course, has been a major factorin increasing effective demand for the elder population of the nation.

An indirect approach to increasing effective demand would be to reduce the cost of the service by increasing the supply. That is, if the supply of health care is increased, the cost of it will be reduced and/or the rate of increase will be less rapid. Consequently, the available dollars will purchase additional health care.

One element in the provision of health care that could be augmented would logically be health manpower. An expansion in the number of health care workers or an increase in their productivity would increase the health care that might be provided. Thus, one reason for an enlarged portion of the total national budget being directed toward increasing our available health manpower would be the reduction of the cost of medical service.

Primarily, Congress has concentrated on two areas: economic and medical assistance and demonstration and training grants. Two examples of such legislation are The Manpower Development and Training Act and the Economic Opportunity Act. In many instances, emphasis is placed on retraining persons in those manpower categories often overlooked such as the physically handicapped, former servicemen, retired workers, volunteers, displaced workers, female help, and minority groups, especially Negroes.[14] More specifically, the Manpower Development and Training Act includes as its objectives: (1) preparing the unskilled; (2) increasing the supply of workers with special and demanded skills; and, (3) increasing the efficiency of labor markets. Included in the implementation of the program are plans calling for research projects directed at solving manpower problems, experimental and demonstration projects, and on-the-job training projects.

The Economic Opportunity Act is likewise devoted to increasing health manpower. However, emphasis in its program is placed on:

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[13] Richard P. Arment, "Medicare Boosts Bed Usage by Elderly," *The Modern Hospital*, February, 1967.

[14] H. M. Engle, "Solving the V. A. Health Manpower Shortage," *Employment Service Review*, November, 1966, p. 39.

(1) educating and training younger people, (2) increasing their motivation, and (3) increasing their opportunities for employment. Several programs have been enumerated to implement such goals. One of the major programs is to provide financial and technical assistance to anti-poverty programs - - Community Action Programs. Another removes youths from detrimental home environments and places them in a center where programs for both educating and working are utilized - - Job Corps. A third method of implementation includes a provision for educating and training unemployed heads of families for various health related jobs - - Work Experiences Programs. Still other programs serving the same purposes are The Neighborhood Youth Corps; and The Youth Opportunity corps. Both are concerned with training and placing youth in various employment positions. It was estimated in 1966 that under both programs an additional 95 thousand persons would have been added to the health team by 1967.[15]

In addition to the two laws previously discussed, numerous other legislation has been passed for the purpose of expanding health manpower. Perhaps two of the more important actions are the Health Professions Education Assistance Act of 1963, as amended in 1965 and 1966, and the Allied Health Professions Personnel Training Act of 1966. The former officially adopts as its objectives the training of health professionals by: (1) granting funds for 66 2/3 percent of costs for construction of new or for major expansion of existing facilities and 50 percent for minor expansion; (2) granting funds for student loans; (3) granting funds for improving existing programs; and by (4) granting funds for scholarships.[16]

The second Allied Health Professions Education Assistance Act also incorporates the same basic plan. Its primary emphasis, however, is placed on nonprofessional or paramedical personnel. More specifically it is:

> To amend the Public Health Service Act, to increase the opportunities for training of medical technologists and personnel in other allied health professions, to improve the educational quality of the schools training such allied health professions personnel, and to strengthen and improve the existing student loan programs for medical, osteopathic, dental, podiatry, pharmacy, optometric, and nursing students, and for other purposes.[17]

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[15] William Mirengoff, Health Manpower - - An Emerging Challenge, *Employment Service Review,* November, 1966, pp. 4, 7.

[16] U. S. Department of Health, Education, and Welfare, Bureau of Health Manpower, *An Introduction* (Washington: U. S. Government Printing Office, 1967).

[17] U. S., Congress, House, Committee on Interstate and Foreign Commerce, *Allied Health Professions Personnel Training Act of 1966,* 89th Cong., 2d Sess., p. 5.

In addition to the above, numerous other legislative actions have been aimed at reducing unmet need, increasing effective demand, and thus helping to provide needed assistance for persons in the less opulent category. For a more extensive list of such laws see **Appendix H**.

SUMMARY

Based on the foregoing examination of relevant demographic variables - - births, deaths, and migration - - it can be concluded that the size of the Green Bay service area population will continue to increase at the approximate rate of 2.53 percent, and its composition will continue to change in the predicted direction. These future changes in population size and composition have significant implications for future levels of health care need in the Green Bay service area. For example, the absolute increase in population size, everything else remaining equal, will effect a corresponding absolute increase in the level of need; and the accelerated growth of the population segments 18 years of age and under and 65 years of age and over will effect a change in the composition of this increase.

An examination of economic indices reveals that the economic trends and totals of Brown County represent substantially those of the state and nation. During the 1940 - 1950 period, employment grew at a more rapid pace than the nation, in 1950 - 1960 slightly lower. Perhaps more important, unemployment totals have remained very low indicating virtually all citizens in the county share in its economic growth.

Some indices of wealth and income, median income in total and by profession, indicate the citizens of the county enjoy a higher level of living than the state or nation; others, for example, bank deposits, indicate a slightly lower level. Perhaps, the two indices of effective buying power sum up the economic health of the community best. On a per-capita basis, Brown County ranks slightly below national levels; on a per-household basis, the county ranks ahead.

The only conclusion from this analysis of economic indices is that "so goes the nation so goes Brown County." If the economic condition of the nation remains strong, every index presented would predict a similar "healthy" economic condition for the county. Essentially, since political leaders are dedicated to a maintenance of economic growth and/or a minimization of economic decline or stagnation, health care plans for Brown County must proceed with the assumption effective demand for health care will remain quite high.

The brief examination of health and health manpower legislation in this chapter partially reveals forces that will supplement those factors affecting effective demand for the future and also the future supply of health manpower. Although the exact magnitude and direction of supplementation can not yet be fully defined, it is inevitable that such legislation will in no small part contribute to the future rise in effective demand by providing additional dollars to citizens or reducing the cost of health care services.

CHAPTER VIII

PROJECTED REQUIREMENTS FOR HEALTH MANPOWER

INTRODUCTION

The requirements for any one category of health manpower are derived from four factors: (1) the need for health care services, (2) the resultant demand for health care services, (3) the delivery system for health care services, and (4) the level of productivity of each category of health manpower. It is recognized that these four factors are not static, but are of a dynamic nature and themselves subject to the influence of other variables. When projecting future health manpower requirements, it is necessary to take into consideration the change in these factors that has occurred in the past as well as the anticipated future. By applying the appropriate statistical techniques, the effect that these factors will have on future health manpower requirements could be measured, assuming that the rate of change in these factors remains the same. However, this is not a realistic assumption in such a dynamic field as medical science. Therefore, these projections of future health manpower requirements are best interpreted as a base from which the effect of future unforeseen changes in these factors can subjectively be determined.

METHODOLOGY OF PREDICTION

Existing methods of predicting the requirements for health manpower are based primarily on changes in the size of the population and the demand for health services in the past. Such methodologies do not consider one very important determinant of demand; medical need. In Chapter IV, a discussion of the relationship between medical need and the demand for health care services was presented. Accordingly, an attempt will be made to incorporate not only indices of the demand for health care services, but also the need for health care services in projecting the requirements for health manpower in the future.

The methodology proposed in this study for projecting future manpower requirements, involves establishing a regression equation (a line of best fit) which can then be utilized to predict one variable given another. In the calculation of the regression equation, the relationship between the two variables is established. This relationship is then utilized to predict the best estimate for one variable, given a value for the other. It is believed that the use of regression analysis will provide a more accurate projection than the use of an average or data for a single year. The regression analysis makes greater use of **all** existing data in establishing a trend.

In the proposed prediction model, both linear and curvalinear regression equations are utilized. (See Appendix I) The determination of the appropriate regression equation was made by an inspection of a bivariate frequency table containing the available values for the variables being considered.

It should be noted that the lack of data for an extended period of time places certain constraints upon the accuracy of the proposed model for projecting future health manpower requirements. That is, the smaller the number of observations, the greater the margin of expected error. However, it is believed that the methodology is sound, and with the availability of additional and better data, would provide the investigator with an improved prediction model.

PROJECTED HEALTH MANPOWER REQUIREMENTS FOR THE GREEN BAY SERVICE AREA

It was previously noted that to utilize the regression equation to predict a variable, one variable must be known with a reasonable degree of certainty. In the proposed model, it is suggested that today most medical conditions are either discovered in the acute stage or later in the chronic stage. And, that while the mix of acute and chronic conditions may change in the next twenty years, changes in the absolute numbers of medical conditions will result primarily from changes in the size and composition of the population. Having projected the population of the Green Bay area for 1975 and 1985 (Chapter VII), it is possible, by applying the rate of acute and chronic medical conditions (Chapter IV), to calculate the expected number of acute and chronic medical conditions for 1975 and 1985. Table 8-1 shows that in 1975, it is estimated that there will exist 441,315 acute medical conditions in the Green Bay area, and 163,996 chronic medical conditions. By 1985, it is estimated that there will exist 584,852 acute medical conditions and 198,254 chronic medical conditions.

As indicated earlier, it is necessary to consider the amount of medical need that is currently not being satisfied; but which can reasonably be expected to be satisfied in the future, when determining the future requirements for health manpower. In this case, satisfied medical need is defined as an existing medical condition that has been seen at least once by a physician. The difference between the number of existing medical conditions and the number of medical conditions seen by a physician is defined as an unmet or unsatisfied medical need.

It will be remembered that two indices of satisfied medical need or

TABLE 8-1

PROJECTED NUMBER OF ACUTE MEDICAL CONDITIONS AND CHRONIC MEDICAL CONDITIONS FOR 1975 AND 1985: GREEN BAY SERVICE AREA[a]

	1975	1985
Acute Medical Conditions	441,315	584,852
Chronic Medical Conditions	163,996	198,254
Total Medical Conditions	605,311	783,106

[a]Source: See Appendix I.

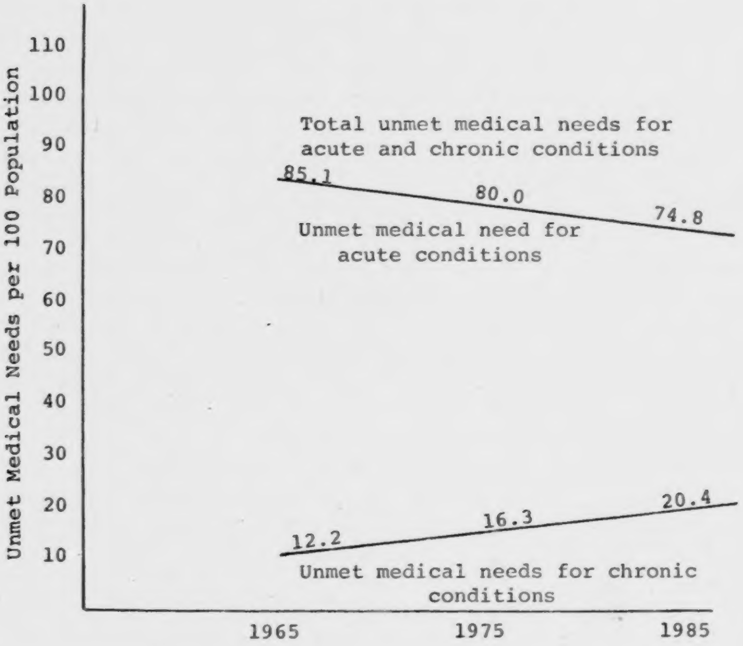
effective demand were presented in Chapter IV: physician visits and conditions seen by a physician. It would be quite possible to use either index in the prediction process. However, for two reasons physician visits represented the better, predictive statistic: (1) age-specific data were available, and (2) a more direct relationship exists between this value and the effective demand for physician services. The first reason is actually self-explanatory, more precise and detailed information is provided if age-specific values are predicted. The second reason suggests the fact that a prediction of conditions seen by a physician would less accurately reflect effective demand because it would fail to consider a possible shift in the number of times each condition is seen.

Unfortunately, physician visit data were available only for one year 1958-59. Conditions seen by a physician in contrast was available for a number of years. Consequently, this study will utilize conditions seen while reiterating not only its preference for physician visits, but also the need to collect this data on a regular basis in the future.

With these constraints in mind, it is now possible to compare indices of need and effective demand to determine both need that has in the past been satisfied and will continue to be, and also need that currently is not being satisfied, but which can reasonably be expected to be satisfied in the future. Since unsatisfied medical need is a function of both need and effective demand, this value will be predicted.

By applying curvalinear regression theory to two variables, unsatisfied medical need and time (expressed in years), it is possible to derive an unmet medical need index, distributed according to a parabolic curve. Based on the available information, the lowest level of unmet medical need that can reasonably be expected according to statistical calculations is 54.4 acute conditions per 100 population. (See Appen-

Fig. 8-1.--Unmet medical need for acute and chronic medical conditions



Source: See Appendix I.

dix I) For the time interval July 1963 to June 1964, the level of unmet medical need in the nation was 73.8 acute conditions per 100 population, considerably higher than the reasonably expected number of 54.4 acute conditions. Thus, it is believed that a reduction of unmet medical need to 54.4 acute conditions per 100 population by 1985 would be a reasonable objective for physicians in the Green Bay area. (See Figure 8-1) To achieve this objective, an average of .92 acute conditions per 100 persons per year more would have to be seen by a physician. Thus, in 1965, physicians would have had to see approximately 223,147 acute conditions, in 1975 physicians would have to see approximately 319,518 acute conditions, and in 1985 physicians would have to see approximately 453,767 acute conditions.(See Appendix I)

Examination of the data provided by the Health Interview Survey on chronic conditions revealed that application of the linear regression equation would be most appropriate in determining an index of unmet medical need for chronic conditions.[1] Assuming the current trends were to continue, the level of unmet medical need for chronic conditions in 1985, according to statistical calculations, would be 20.4 chronic conditions per 100 population. (See figure 8-1) It is estimated that to achieve this level of unmet medical need for chronic conditions, physicians would have had to see 116,674 chronic conditions in 1965, 132,809 chronic conditions would have to be seen in 1975 and 148,726 chronic conditions in 1985. (See Appendix I)

In 1965, there were 130 physicians in Brown County.[2] These physicians treated approximately 339,821 acute and chronic conditions, or 2,614 conditions per physician. If this same ratio of conditions treated per physician is to be maintained in 1975 and 1985, 173 physisians will be needed by 1975 and 230 physicians by 1985. (See Appendix I) These projections are based upon the estimated number of acute and chronic conditions that will be seen by a physician if the statistically determined level of unmet medical need, as previously stated for 1975 and 1985, is to be achieved. A significant increase in the number of physicians will be required in both 1975 and 1985 if the rate of 2,614 conditions seen per physician is to be maintained. This increase is due in part to the growing population, and the increasing number of medical conditions being seen by physicians.

The only other members of the health team for which there is sufficient data available to project future manpower requirements are professional, registered nurses and hospital employees (including professional, registered nurses). Since about two-thirds of employed registered nurses in the nation work in hospital nursing services, excluding the self-

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[1] *Ibid.*

[2] Wisconsin State Board of Health, *State Plan for Hospital and Medical Facilities,* 1966-1967.

TABLE 8-2

PROJECTED REQUIREMENTS FOR PROFESSIONAL, REGISTERED NURSES AND HOSPITAL EMPLOYEES IN 1975 AND 1985: GREEN BAY SERVICE AREA[a]

	1975	1985
Professional, Registered Nurses in the Service Area	606	788
Professional, Registered Nurses Employed by Hospitals	473	584
Hospital Employees (Including Professional Nurses)	1,573	2,045

[a] Source: See Appendix

employed private duty nurses;[3] it seems appropriate to base the projections of professional nurses and other hospital employees on an index of hospital utilization.

It was originally intended to use patient days as an index of hospital utilization. However, because of the recent fluctuation in the length of patient stay, which is reflected by the number of patient days, it was decided to use the number of annual admissions as the index of hospital utilization. The relationship between hospital admissions and the number of acute conditions seen by a physician was determined by applying a linear regression equation to the data for the years 1958-1959 to 1963-1964. (See Appendix I) Having determined this relationship, it was then utilized to project the number of hospital admissions for 1975 and 1985, based on the number of acute conditions seen by a physician. The number of acute conditions, rather than the total number of medical conditions, is used because all three hospitals in the Green Bay area are short-term, general hospitals. The number of acute conditions seen by a physician for 1975 and 1985 was previously identified when projecting the number of physicians needed for these same years. Based on these calculations, it is estimated that there will be 32,894 hospital admissions in the Green Bay area, in 1975 and 37,327 hospital admissions in 1985.

Table 8-2 presents the ratio of professional, registered nurses; professional, registered nurses employed by hospitals; and hospital employees, including professional nurses; and hospital admissions in 1965. Table 8-2 also presents the estimated hospital admissions for 1975 and

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[3] *Facts about Nursing* (New York: American Nurses' Association, 1967), P. 17.

1985, and the number of professional, registered nurses and hospital employees necessary to maintain the 1965 ratios of professional, registered nurses and other hospital employees to hospital admissions.

SUMMARY

Four factors have been identified as being primarily responsible for the requirements for any one category of health manpower: (1) the need for health care services, (2) the demand for health care services, (3) the delivery system for health care services, and (4) the level of productivity for each category of health manpower. It was pointed out that these factors are not static, but are continually changing as a result of other intervening variables. In projecting health manpower requirements, past changes in these factors as well as anticipated future changes must be considered.

It has been pointed out that existing methods for projecting health manpower requirements have been based primarily on changes in the size of the population and the past demand for health services. This study has presented another important determinant of demand for health manpower -- medical need. (See Figure 8-1)

A new methodology for projecting health manpower requirements based on statistical regression analysis has been proposed. This methodology was applied to the Green Bay, Wisconsin service area and projections were made for requirements of physicians, professional, registered nurses, professional, registered nurses employed by hospitals, and hospital employees in total for the years 1975 and 1985. The methodology appears sound and could be applied to other health manpower when sufficient data becomes available.

The major limitation of the proposed methodology is that it does not take into consideration changes in the four factors identified as being primarily responsible for the requirements of health manpower, (a weakness of all projection methods) other than those predictable from past trends. It does, however, provide a base from which the effect of future changes in these factors can be subjectively determined.

SECTION IV

EDUCATIONAL SYSTEM

The study to date has examined health systems, health manpower, educational institutions, and the demand for health care services. For example, Section I examined the development of health manpower and health care systems. Section II focused upon the existing need/demand for health care, health manpower, and educational institutions with particular emphasis upon the Green Bay and eastern Wisconsin region. Section III then dealt with existing trends in the factors which provide the basis for projections of the future need for health manpower. Additionally, Section III utilized linear and curvilinear regression theory to project the necessary health manpower.

Section IV must then discuss the educational facilities needed to produce the projected health manpower. It must be especially cognizant of the four delineated factors of projected manpower needs: (1) medical need; (2) effective demand; (3) the health system; and (4) the productivity of health manpower. It should be obvious that changes in any or all of the factors would result in a change in the health manpower needed and thus in the demand for educational facilities.

CHAPTER IX

EDUCATIONAL FACILITIES FOR THE FUTURE

INTRODUCTION

The investigation undertaken throughout this study has pointed to the increase in the demand for health care services, and the resultant need for greater numbers of well-trained personnel in the health sciences. Chapter VIII, discussing the projected demand for health manpower, has presented a formulation designed to relate the anticipated number of physician visits to health needs and the demand for health services. This data formed the basis for the projection of the number of physicians needed in 1975 (173) and number in 1985 (230). It should be noted, however, that these figures do not represent the additional physicians which the area will need to recruit simply because some of the currently practicing physicians in Green Bay and the surrounding area should still be providing health services. (See Chapter V, Table 5-4 for an aging distribution of currently practicing physicians.)

Similar trends in the requirements for nurses and paramedical personnel are to be expected. In addition, it has been established in a survey conducted by the Wisconsin State Board of Health that as of May, 1966, the Green Bay region was already deficient in manpower in the following major categories: Professional nurses (56), trained practical nurses (20), pharmacists (8), medical technologists (6), and physical therapists (3). However, while it appears from the data presented in the survey that Green Bay has the least critical needs of any region of the state in terms of absolute numbers, this is in no way indicative of longer range trends and the possibility that the situation might be radically altered either favorably or unfavorably.

LIMITING FACTORS ON EDUCATIONAL FACILITIES SPECIFICATION

While it would be quite easy to accept the projected number of health personnel as the number needed in 1975 and 1985, it is necessary to reiterate that the number specified is only a base figure and is subject to substantial revision. There are many variables that can not be predicted which may have a significant impact upon the numbers and even more importantly the mix of personnel needed.

For example, the new health system proposed has not been implemented and thus its impact can not be accessed. Naturally, it is hoped that it will reduce the needed health personnel, but a prediction as to the extent of the decrease would indicate a level of exactness unattainable. It is best to only specify that its implementation will necessitate a continual investigation into the health manpower needed to effectively and efficiently serve the population.

Additionally, the team training concept should reduce the need for the more highly trained and educated personnel by assigning those tasks to the less educated that they can adequately fulfill. Thus, there may be a reduction in the demand for those categories of manpower which require substantial investments in education and training such as physicians.

There are other limiting factors upon the exact specification of the number of health manpower which specific institutions should produce. For example, one very important factor is the simple fact that Green Bay, eastern Wisconsin or even the entire state does not represent a closed health and educational system. Personnel trained and educated in the area often go elsewhere upon completion of their training while personnel trained and educated in other areas come into the Green Bay region. Thus, specification of the role of educational institutions which supply the delineated region would necessitate a delineation of the role of institutions across the entire country. For this reason and also the indicated possible changes in the need for health manpower in total and by category, the remainder of this chapter will focus on the type of educational program and its needs rather than on the numbers each institution should produce.

In summary, it is believed that those who are involved in the provision of health care and those involved in the education of health sciences manpower should be primarily concerned with three basic variables: (1) the number of personnel needed in the future based upon **all available data**; (2) the factors which may change the number or mix of those needed, especially those which could reduce the need; and (3) the best method to train, educate, and utilize them. Accordingly, Chapter VIII was primarily concerned with the first variable. This chapter to date has dealt basically with the second variable. The remainder of this chapter will be principally directed toward the third; improved methods of training, education, and utilization, but will of necessity involve discussions of the resulting changes in the size and composition of needed health manpower.

TEAM TRAINING CONCEPT

As previously stressed, the emphasis on the development of paramedical personnel as a significant input in the care of the sick, due, to technological advancements in the fields of health and medical services, has signaled the emergence of a new philosophy in the delivery of patient care services. This new philosophy concentrates on a coordinated team approach which relieves much of the burden traditionally borne by the physician and professional nurse. The concept of the health team has reached a state of respectability in medical circles, but still encounters a measure of resistance from the more traditional and older professions of medicine and nursing. While the acceptance has grown, and the health team has become a recognizable portion of the delivery of health services, there has not yet been developed an educational program specifically attuned to the special requirements of this concept. Establishment of such programs will be of utmost importance to the future of health care services on the presumption that the current trends in health need/demand and the resultant need for health manpower will continue into the foreseeable future.

Whether such trends continue or not is a matter of some debate. It is still possible that the role of the physician will further evolve into that of the team leader in an even more rigorous sense than it is presently. More members would then need to be added to the health team in order to fill the void created by the concentration of the physician's attentions in the more esoteric areas of medicine leaving more of the routine treatment and decision making to other members of the team. Conjoining this with the foregoing summary of Chapters V and VIII, it becomes apparent that the future may witness a decrease in the numbers of doctors in proportion to medical need/demand without any concurrent decrease in the quality of medical and health services due to a greater reliance upon the health team. That is to say, the health team mix, of necessity variable from case to case as each situation determines its own requirements for personnel, may also have a long-term trend toward greater utilization of allied health sciences personnel. This would be a logical extrapolation of the present trend, however, the extent of such a trend for the future is not specifically quantifiable due to the rapid introduction of a series of external variables such as education and health legislation.

In any event, the locus of quality medical care and even medical practice remains in the hospital and the most significant aspect of the hospital as a center of health care is the concept of the health care team. It is also apparent that the team is both variable and changing, and hence, the proper approach to education is the adoption of a program of instruction that will produce not only sufficient quantities of the needed personnel, but one capable of the flexibility necessary to meet the demands of contemporary health services for the **types** of personnel required.

COMPREHENSIVE INTEGRATION OF EDUCATIONAL INSTITUTIONS

To this point, the necessary comprehensive integration of primary and continuing education of all health personnel within the academic and hospital environment has been emphasized. Such a comprehensive integration of a variety of professional programs in an interrelated group of affiliated institutions has been designated as the "health camplex." This study suggests then that the constitution of such a health camplex would enable the hospital to orient its educational role toward the clinical support of the academic programs offered by accredited institutions of higher learning.

Accordingly, Chapter VI has introduced the concept of the integrated or converging curriculum as a tool of education in the various health sciences. Combining this concept with previously identified concepts, the remainder of this chapter will recapitulate and expand upon the following subjects: (1) the integrated health sciences curriculum, (2) the health camplex, and (3) considerations for successful implementation of these concepts for more effective education.

THE INTEGRATED CURRICULUM

Integration of the training of the various allied health sciences personnel into a single program in the health sciences with concentrations in the areas of specialized interests will permit the enrichment of the curriculum of the institutions involved to the benefit of the individual student. A broadening of the curriculum will permit the expansion of the knowledge available to the student and thus widen his own intellectual capacities. It will further allow him to construct his own frame of reference in projecting himself into the health care team, and even more broadly, into society in general. Especially significant would be an increased emphasis on the social sciences as a tool enabling the individual to relate himself to other professionals and the patients whom he will serve.

This greater emphasis upon the social sciences is, of necessity, a key consideration in any discussion of an expanded curriculum. Psychology and sociology are invariably introduced in most undergraduate college courses in which health personnel are involved. However, the courses are seldom taught with the intention of specifically preparing the individual for his field, nor are advanced courses usually required except in the particular areas where they constitute the major portion of the course of study. For physicians an important addition, and one which may, of course, be of value to other personnel, would be an introduction to economics. Seldom is this discipline given any prominence in the training of physicians primarily due to the time constraints, yet a substantial number of physicians are businessmen in their own right.

Within the category of the health sciences, it is obvious that an integration of the basic sciences taught to the allied health personnel would be economically sound, and valuable in terms of providing the opportunity for fledgling personnel to interact together on the exegesis and the solution of problems of common interest. Weil and Parrish (see Appendix J) point out that students in training programs in the allied health sciences are required to take such courses as: Chemistry, anatomy, bacteriology, microbiology, pathology, pharmacology, physics and physiology. Although the requirements in, for example, anatomy, may be slightly different for a dental hygienist, an inhalation therapist, an occupational therapist, or a professional nurse, the exposure to other professionals, and the opportunity for educational enrichment of the courses make an integration of the curriculum and teaching functions highly desirable.

While it would be impossible to develop a model curriculum for all of the allied health sciences, due to the necessary differences in the relative emphasis in particular subject areas, it is valuable to understand the advantages that will accrue from the integration of the educational experiences of students in the various disciplines. The primary consideration becomes not so much the delineation of a rigidly determined academic program, but rather the attempt to provide a sufficiently broad academic foundation upon which individual students may design their programs to include all of the fundamentals, plus a variety of individual interests pursued in some depth. If this begins to sound like the program cultivated in the traditional liberal arts pattern of instruction, the similarity is well noted. In an age when knowledge is becoming increasingly diversified, and instruction has been splintered into a multiplicity of widely separated disciplines, it has become apparent that a new, conceptual integration must be established to maintain continued communication among the segments of the educated community. The health sciences, like the natural sciences and social sciences, are developed to the point that centrifugal forces in the field have been carried into the arena of education resulting in the present trend toward further separation. It would appear that the time has come to seriously consider measures to halt and if possible reverse this trend, one of which is the establishment of an integrated program in the health sciences.

HEALTH CAMPLEX

The health camplex has been described previously in this study, but some reiteration of the salient features of the proposal are in order. In discussing the total system, it was established that the logical base area centers would be the University of Wisconsin at Madison and the Marquette University at Milwaukee. Both of these institutions possess sufficient facilities in terms of classrooms, courses, and clinical opportunities to form the nucleus for extensive integrated training of health personnel from the physician through all the varieties of paramedical personnel. Moreover, both of these centers are engaged in on-going programs which could be easily adjusted given sufficient foresight on the part of the faculty and administration concerned. A full range of all health services would be available within these two institutions, and also, all types of personnel would be trained.

Below the base area centers of Madison and Milwaukee would be a hierarchy of other levels of health care and instruction of personnel. The second level would be the regional center incorporating hospital and academic facilities with an approximately equal commitment to care and education, as opposed to the heavily education-research bias of the base area center. The lower levels, ranging from the hospital to the physician's office, would be more directly concerned with the delivery of health care services. In most cases, this would also represent a point of initial entry into the health care system and the locus of treatment for the more routine evaluations and treatment. There would be little significant engagement in the education of health manpower.

The regional level is of the utmost concern to Green Bay.[1] With the presence of three hospitals, the educational opportunities within the area, and a population sufficient to support the identified level of care and training, it is desirable to establish Green Bay as a regional center. The plan then calls for the coordination of the hospitals with the education institutions of the immediate area in establishing an integrated educational system drawing upon the various resources available. This regional center would contain programs of initial training, and the opportunities for continuing education of the professionals currently active in the field. The two major requirements of this proposal are, of course, the coordination of activities for the conservation of personnel and expensive equipment, and the inclusion of an organized educational

[1] As the medical school of the University of Wisconsin, Green Bay, developes Green Bay would become a base area center. Commensurate with an identification as a base area center would be a commitment to expanded health care and educational services.

program designed to make a significant contribution toward providing well-educated personnel by making use of the existing facilities in the area.

SUCCESSFUL IMPLEMENTATION

To successfully make this a significant contribution for the education of health manpower, the curriculum must be attractive to prospective students, and an active effort must be undertaken to recruit students for the allied health professions. Therefore, emphasis must be placed upon the quality of the education, as has been stressed in the discussion of the integrated curriculum. That is, the courses must not only be pertinent to the needs of the student, but interesting to students in related disciplines and available to them as they may require. Constant evaluation of the curriculum is important for periodic updating of knowledge in the field in order to maintain consistency with the ever increasing demands for optimum health services. This provides an opportunity for the development of a high level of intellectual excitement and stimulation.

SUMMARY

This chapter has outlined the integration of educational and clinical facilities into a single camplex. The most significant aspect of the program as outlined should be the salutary effects on providing adequate personnel to meet the medical and health needs of the population. An extremely important consideration in the implementation of this system is its consequences in terms of the manpower mix. Upon implementation it may become apparent that while the physician remains the preeminent leader of the health team, his numbers may remain relatively static even in the face of population growth. That is, the paramedical personnel will assume an even greater role in the direct treatment and care of the patient, with the physician conserving his professional abilities through his position as leader. Thus, in conclusion, it seems probable that such team training and organization when successfully implemented will more efficiently serve the residents of Green Bay and eastern Wisconsin.

CHAPTER X

FUTURE ENDEAVORS

1. In attaching significance to the conclusions and recommendations of this study one basic limiting factor must be considered; namely, that the foundation on which they are based is constructed from what is in most cases limited data. Throughout the formative segment of this study this basic shortage of data represented a factor which restricted meaningful analysis. It has been mentioned that the problem can not be circumvented, and is one that restricts nearly any descriptive research effort. Recognizing this limitation, however, does not mean that it should be completely accepted. A continuing effort must be made by **those concerned** to develop and apply new techniques for acquiring relevant data - - data which will enhance a research effort such as that presently undertaken. Three specific recommendations as to the type and method of gathering data follow:

a) A standard reporting system for all hospitals and health care institutions should be developed. This would allow comparability of the data assembled.

b) Similar data should also be gathered on physicians' visits. A computerized data processing system with prepunched data cards based upon specific disease entity could be employed. The ease of use by physicians is a necessity if complete and accurate data is to be collected.

c) Data on the incidence and prevalence of illness by region is the third type of data which must be collected. This data provides the basis for a determination of medical need. Regional data collected systematically could also provide the basis for a determination of national totals. Thus, both regional and national incidence and prevalence patterns would be available for analysis and comparison.

2. A task force should be established to study the specific Green Bay and eastern Wisconsin region. The task force in conjunction with community representatives should attempt to specify which health care resources the particular community must itself support, and which resources the health care system might provide. Additionally, the task force could study the feasibility of the establishment of the dispersal center in particular communities. Efforts should be undertaken to acquire funding through demonstration and research grants which are available for the study of health care delivery systems.

3. While it may presently appear an improbability that an integrated curriculum for all of the health professions in the Green Bay Health Camplex can be effectively developed; knowledge-generating research, properly directed, will perhaps uncover the means to accom-

plish this task. It should thus be the objective of all concerned to pursue the indicated objective. National demonstration and research grants are also available for such purposes and could logically provide the financial means to accomplish the task. Efforts to secure such grants by appropriate representatives in the Green Bay area should be immediately undertaken.

4. Priority should be given to the continual recruitment of quality health personnel in all categories. The indicated increase in the need/demand for health services and the concurrent increase in demand for health personnel makes an active recruitment program a prerequisite for the provision of quality care for all. Special emphasis should be directed toward the recruitment of the categories of health manpower identified as currently deficient in the Green Bay area; registered nurses, licensed practical nurses, medical technologists, pharmacists, and physical therapists.

5. Additional research in the future must be directed toward the concept of an appropriate facility team mix. Each type of institution must be identified and a separate analysis undertaken to determine the facility team mix that can most effectively and efficiently provide the type and number of health services offered by each institution. The role of each individual within the facility team must also be determined. The appropriate role of each category of health manpower must be determined if the entire system is to function in the manner intended.

6. Finally, in an analysis of statistics received from the various institutions in the Green Bay region, it became quite obvious that consistency in job description and job classification was almost totally lacking. It thus, becomes imperative that categories of health personnel become standardized. Only if the analyst can be reasonably assured that data reported by all institutions is comparable, can progress be made in health manpower research. The U. S. Department of Labor published in 1965, *Health Careers Guidebook,* which lists categories of health manpower with a description of each. The guidebook could be used to accomplish the stated objective.

APPENDIX A

BACCALAUREATE AND DIPLOMA NURSING PROGRAMS IN THE STATE OF WISCONSIN

BACCALAUREATE PROGRAMS

Eau Claire: Wisconsin State University

Fond du Lac: Marion College of Fond du Lac

Madison: University of Wisconsin

Milwaukee: Alverno College,
Marquette University
University of Wisconsin

ASSOCIATE DEGREE

Milwaukee: Milwaukee Institute of Technology

DIPLOMA PROGRAMS

Eau Claire: Luther Hospital

Green Bay: Bellin Hospital

Janesville: Mercy Hospital

La Crosse: St. Francis Hospital

Madison: Madison General Hospital
Methodist Hospital
St. Mary's Hospital

Manitowoc: Holy Family Hospital

Marshfield: St. Joseph's Hospital

Milwaukee: Columbia Hospital
Evangelical Deaconess Hospital
Lutheran Hospital
Milwaukee County General Hospital
Milwaukee Hospital
Mount Sinai Hospital
St. Mary's Hospital

Oshkosh: Mercy Hospital

Racine: St. Luke's Hospital

Wausau: St. Mary's Hospital

APPENDIX B

HOSPITALS WITH SEVERAL PROGRAMS IN THE ALLIED HEALTH SCIENCES, NORTHEASTERN WISCONSIN

Fond du Lac: St. Agnes' Hospital
- Medical Technology
- X-ray Technology

Green Bay: Bellin Memorial Hospital
- Nursing
- X-ray Technology

Oshkosh: Mercy Hospital
- Nursing
- X-ray Technology
- Medical Technology
- Nurse Anesthetist

APPENDIX C

SCHOOLS OF PRACTICAL NURSING IN THE STATE OF WISCONSIN[a]

Location	**Graduated**	**Enrolled**
Fond du Lac	72	46
Green Bay	42	47
Kenosha	105	109
Coleman (LaCrosse)	--	--
Madison	80	86
Milwaukee	143	108
Sacred Heart School of Practical Nursing, Milwaukee	100	97
Stevens Point	19	17
Superior	33	40

[a] **Source**: *State Approved Schools of Practical and Vocational Nursing* (New York: National League for Nursing, 1966).

APPENDIX D

PROGRAMS IN ALLIED HEALTH SCIENCES IN WISCONSIN

CYTOTECHNOLOGY

Madison: School of Cancer Cytotechnology,
University of Wisconsin
Milwaukee: Milwaukee County General hospital

MEDICAL RECORDS

La Crosse: St. Francis Hospital

NURSE ANESTHETIST

La Crosse: St. Francis Hospital
Milwaukee: Milwaukee County General Hospital
Oshkosh: Mercy Hospital
Wausau: St. Mary's Hospital

OCCUPATIONAL THERAPY

Madison: University of Wisconsin
Milwaukee: Mount Mary College

PHARMACY

Madison: University of Wisconsin

PHYSICAL THERAPY

Madison: University of Wisconsin Medical School
Milwaukee: Marquette University

MEDICAL TECHNOLOGY

Beaver Dam: St. Joseph's Hospital
Beloit: Beloit Memorial Hospital
Eau Claire: Luther Hospital, Sacred Heart Hospital
Fond du Lac: St. Agnes' Hospital

Green Bay: St. Vincent Hospital
Kenosha: Kenosha Memorial Hospital
St. Catherine's Hospital
La Crosse: St. Francis Hospital
Madison: Madison General Hospital
St. Mary's Hospital
Marshfield: St. Joseph's Hospital
Milwaukee: Columbia Hospital
Doctor's Hospital
Evangelical Deaconess
Lutheran Hospital
Milwaukee Children's Hospital
Milwaukee County General Hospital
Misericordia Hospital
Mount Sinai Hospital
St. Joseph's Hospital
St. Luke's Hospital
St. Mary's Hospital
St. Michael's Hospital
Oshkosh: Mercy Hospital
Racine: St. Luke's Hospital
St. Mary's Hospital
Stevens Point: St. Michael's Hospital
Waukesha: Waukesha Memorial Hospital
Wausau: St. Mary's Hospital
West Allis: West Allis Memorial Hospital
Wood: Veteran's Administration Hospital

X-RAY TECHNOLOGY

Beloit: Beloit Memorial Hospital
Cudahy: Trinity Memorial Hospital
Eau Claire: Luther Hospital
Sacred Heart Hospital
Fond du Lac: St. Agnes' Hospital
Green Bay: Bellin Memorial Hospital
Janesville: Mercy Hospital
LaCrosse: Adolph Gunderson Medical Foundation
St. Francis Hospital

Madison: St. Mary's Hospital
University Hospitals

Marshfield: St. Joseph's Hospital

Milwaukee: Columbia Hospital
Doctors' Hospital
Evangelical Deaconess Hospital
Lutheran Hospital of Milwaukee
Milwaukee County General Hospital
Misericordia Hospital
Mount Sinai Hospital
St. Joseph's Hospital
St. Luke's Hospital
St. Mary's Hospital

Neenah: Theda Clark Memorial Hospital

Oshkosh: Mercy Hospital

Rhinelander: St. Mary's Hospital

Waukesha: Waukesha Memorial Hospital

Wausau: St. Mary's Hospital

APPENDIX E

COLLEGES AND UNIVERSITIES IN WISCONSIN

Name	Location
Alverno College	Milwaukee
Barron County Teachers College	Rice Lake
Beloit College	Beloit
Buffalo County Teachers College	Alma
Cardinal Stritch College	Milwaukee
Carroll College	Waukesha
Carthage College	Kenosha
Concordia College	Milwaukee
Dodge County Teachers College	Mayville
Dominican College	Racine
Door-Kewaunee Teachers College	Algoma
Holy Family College	Manitowoc
Green County Teachers College	Monroe
Lakeland College	Sheboygan
Langlade County Teachers College	Antigo
Lawrence University	Appleton
Layton School of Art	Milwaukee
Lincoln County Teachers College	Merrill
Manitowoc County Teachers College	Manitowoc
Marinette County Teachers College	Marinette
Marion College of Fond du Lac	Fond du Lac
Marquette University	Milwaukee
Milwaukee-Downer College	Milwaukee
Milwaukee Institute of Technology	Milwaukee
Milwaukee School of Engineering	Milwaukee
Milton College	Milton
Mount Mary College	Milwaukee
Nashotah House	Nashotah
Northland College	Ashland
Outagamie County Teachers College	Kaukauna
Polk County Teachers College	Frederic

Name	Location
Racine-Kenosha County Teachers College	Union Grove
Ripon College	Ripon
Sauk County Teachers College	Reedsburg
Saint Francis College	Burlington
Saint Norbert College	West De Pere
Stout State University	Menomonie
Taylor County Teachers College	Medford
Vernon County Teachers College	Viroqua
Viterbo College	La Crosse
Waushara County Teachers College	Wautoma
Wisconsin, State of	
University of Wisconsin	Madison
University of Wisconsin	Milwaukee
Eau Claire State	Eau Claire
La Crosse State	La Crosse
Menomonie State	Menomonie
Oshkosh State	Oshkosh
Platteville State	Platteville
River Falls State	River Falls
Stevens Point State	Stevens Point
Superior State	Superior
Whitewater State	Whitewater
Wood County Teachers College	Wisconsin Rapids

APPENDIX F

TECHNICAL INSTITUTES, SCHOOLS OF VOCATIONAL, TECHNICAL, AND ADULT EDUCATION, AND VOCATIONAL EVENING SCHOOLS IN WISCONSIN

TECHNICAL INSTITUTES

Appleton
Eau Claire
Green Bay
Kenosha
Madison
Milwaukee
Oshkosh
Racine
Wausau

VOCATIONAL, TECHNICAL, AND ADULT EDUCATION

Antigo
Ashland
Beaver Dam
Beloit
Chippewa Falls
Cudahy
Fond du Lac
Fort Atkinson
Janesville
Kaukauna
La Crosse
Manitowoc
Marinette
Marshfield
Menasha
Merrill
Neenah
Port Washington
Rhinelander
Rice Lake
Sheboygan
South Milwaukee
Stevens Point
Stoughton
Sturgeon Bay
Superior
Two Rivers
Watertown
Waukesha
West Allis
West Bend
Wisconsin Rapids

VOCATIONAL EVENING SCHOOLS

Baraboo
Brillion
Hartford
Kimberley
Menomonie
Monroe
New Holstein
New Lisbon
Niagara
Oconomowoc
Oconto
Portage
Prairie du Chien
Reedsburg
Richland Center
Shorewood
Sparta
Tomah
Tomahawk
Waupun
Wauwatosa

APPENDIX G

POPULATION PROJECTIONS

1. Arithmetic Projection Method[1]

$$\frac{P_x - P_y}{I} \times T + P_o = P_h$$

P_h = population in the target year

P_o = population from year projected

P_x = population in more recent selected year

P_y = population in earlier selected year

T = number of years between P_o and P_h

I = number of years between P_x and P_y

2. Example:

Project the population of Brown County from 1960 to 1970 using the data for 1940 and 1950 from the U. S. Census Bureau.

$$\frac{98{,}314 - 83{,}109}{10} \times 10 + 125{,}082 = 130{,}287$$

[1] United Nations, Department of Economics on Social Affairs, *Methods of Estimating Population,* Series 10 (1952), P. 281.

It should be noted that this example is for Brown County only. The projections made in the study were for the total service area.

In the second set of projections the estimates for the age-cohorts were obtained in the following manner:

a) Calculate the percentage of each age-cohort for Brown County for the years 1940, 1950, 1960. This was accomplished by dividing the absolute number of persons in the specific age-cohort by the total population.

b) Obtain the median percentage of increase (or decrease) for each age-cohort and project into the future these rates by applying the same methodology previously discussed.

c) Determine the percentage each age-cohort represents of the total population for 1970, 1975, 1980, and 1985 and apply this percentage to the population base previously determined. (See Chapter VII, Table 7-4) That is, multiply the percentage for age-cohort times the total population to find the absolute number of persons in the specific age groupings.

Appendix H

Federal Aid Available for Education and Training of Health Service Personnel

[See p. 62 for exclusions and footnotes]

Agency and program	Level of training [1]	Type of aid	Extent of support for health occupations training	Amount of aid (millions)
DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE **PUBLIC HEALTH SERVICE** **Health professions educational assistance:**				
Grants for construction of new, expanded, or improved teaching facilities (Health Professions Educational Assistance Act of 1963, as amended in 1965 and 1966) (P.L. 88-129, approved Sept. 24 1963; 42 U.S.C. 293-293h).	BP	Grants for up to 66⅔ percent of costs of construction of new schools or major expansion of existing schools; 50 percent of costs of minor expansion, renovation, or replacement (veterinary medicine added in 1966).	Grants through Mar. 1, 1967 will provide for a total of 3,324 new 1st-year places in schools of medicine, dentistry, public health, pharmacy, and optometry.	$135.0 (1967 appropriation).
Health professions student loans (Health Professions Educational Assistance Act of 1963, as amended in 1965 and 1966) (P.L. 88-129, approved Sept. 24, 1963; 42 U.S.C. (294-294c).	BP	Support of student loan funds for students of medicine, dentistry, and other health professions (veterinary medicine added in 1966).	In fiscal year 1967, loans were given to some 21,000 students in health professions.	$25.3 for capital contributions and $10.0 for revolving funds (1967 appropriations).
Improvement grants (Health Professions Educational Assistance Amendments of 1965) (P.L. 89-290, approved Oct. 22, 1965; 42 U.S.C. 295f-295f-4).	BP	Basic improvement (formula) grants and special improvement grants to schools for improvement of educational programs; no matching required.	Approximately 170 accredited schools of medicine, osteopathy, dentistry, optometry, and podiatry received basic improvement grants in fiscal year 1967.	$30.0 (1967 appropriation).
Scholarship grants (Health Professions Educational Assistance Amendments of 1965) (P.L. 89-290, approved Oct. 22, 1965; 42 U.S.C. 295g).	BP	Grants to schools for scholarships to needy students in health professions, up to $2,500 a year; no matching required.	About 2,000 students of medicine, osteopathy, dentistry, optometry, pharmacy, and podiatry received aid in fiscal year 1967.	$4.0 (1967 appropriation).

Agency and program	Level of training[1]	Type of aid	Extent of support for health occupations training	Amount of aid (millions)
Nurse training:				
Grants for construction of new, expanded or improved teaching facilities (Nurse Training Act of 1964) (P.L. 88-581, approved Sept. 4, 1964, 42 U.S.C. 296-296c).	JC, BP, B	Grants for up to 66⅔ percent of costs of construction of new schools or major expansion of existing schools, 50 percent of costs of minor expansion, renovation, or replacement.	Grants through Apr. 30, 1967, will add 2,240 new 1st-year nursing school places.	$25.0 (1967 appropriation).
Nursing student loans (Nurse Training Act of 1964, as amended in 1965 and 1966) (P.L. 88-581, approved Sept. 4, 1964, 42 U.S.C. 297-297g).	JC, BP, B	Support of student loan funds for nursing students.	In fiscal year 1967, loans were given to 17,000 nursing students.	$16.9 for capital contributions and $2.0 in revolving funds (1967 appropriations).
Project grants for improvement of nurse training (Nurse Training Act of 1964) (P.L. 88-581, approved Sept. 4, 1964, 42 U.S.C. 296d).	JC, BP, B	Aid for instructional costs and other costs of improving educational programs.	All accredited schools of nursing may apply for grants.	$4.0 (1967 appropriation).
Payments to diploma nursing schools (Nurse Training Act of 1964) (P.L. 88-581, approved Sept. 4, 1964; 42 U.S.C. 296e).	BP	Formula grants to reimburse schools in part for training students whose enrollment is attributable to Nurse Training Act.	Some 383 schools received aid totaling $3 million in fiscal year 1967.	$5.0 (1967 appropriation).
Opportunity grants for nursing education (Nurse Training Act of 1964, as amended by Allied Health Professions Personnel Training Act of 1966) (P.L. 89-751, approved Nov. 3, 1966; 42 U.S.C. 298c-298c-6).	JC, BP, B	Grants to schools for scholarships to needy students, up to $800 a year (or $1,000 for students in upper half of class).	About 6,750 students will receive grants totaling about $5 million in fiscal year 1968, when the program goes into operation.	$0.75 (1967 appropriation).
Contracts to encourage full utilization of nursing educational talent (Nurse Training Act of 1964, as amended by Allied Health Professions Personnel Training Act of 1966) (P.L. 89-751, approved Nov. 3, 1966; 42 U.S.C. 298c-7).	JC, BP, B...	Aid for the purpose of identifying qualified youths of exceptional financial need and encouraging them to undertake training in field of nursing; and publicizing existing forms of financial aid.	State and local educational agencies and other public or nonprofit organizations and institutions may receive contract funds for this purpose.	No funds appropriated in 1967.

Agency and program	Level of training[1]	Type of aid	Extent of support for health occupations training	Amount of aid (millions)
Advanced traineeships for professional nurses (Health Amendments Act of 1956, and subsequent legislation, through Nurse Training Act of 1964) (P.L. 88-581, approved Sept. 4, 1964; 42 U.S.C. 297).	B, G, PG, C	Grants for traineeships to nurses preparing to be administrators, supervisors, teachers, specialists.	Estimated number of long-term trainees in fiscal year 1967: 2,000.	$10.0 (1967 appropriation).
Allied health personnel training:				
Grants for construction of new, expanded or improved teaching facilities (Allied Health Professions Personnel Training Act of 1966) (P.L. 89-751, approved Nov. 3, 1966; 42 U.S.C. 295h).	JC, B, G	Grants for up to 66⅔ percent of costs of construction of new schools or major expansion of existing schools; 50 percent of costs of minor expansions, renovation, or replacement.	Accredited training centers for allied health professions eligible for aid.	No funds appropriated in 1967.
Improvement grants (Allied Health Professions Personnel Training Act of 1966) (P.L. 89-751, approved Nov. 3, 1966; 42 U.S.C. 295h-1).	JC, B, G	Formula grants and project grants to schools for improvement of educational programs; no matching required.	Same as construction grants above.	$2.8 (approximate share of 1967 appropriation).
Advanced traineeships (Allied Health Professions Personnel Training Act of 1966) (P.L. 89-751, approved Nov. 3, 1966; 42 U.S.C. 295h-2).	JC, B, G	Support for traineeships for advanced training of individuals preparing to be teachers, supervisors, administrators, specialists; no matching required.	Training centers for allied health personnel which are affiliated with a medical or dental school may apply for grants.	$0.75 (approximate share of 1967 appropriation).
Project grants for curriculum development (Allied Health Professions Personnel Training Act of 1966) (P.L. 89-751, approved Nov. 3, 1966; 42 U.S.C. 295h-3).	JC, B, G	Project grants for curriculum development; no matching required.	Same as construction grants above.	$0.2 (approximate share of 1967 appropriation).
Public health training:				
Public health traineeships (sec. 306 of Public Health Service Act; 42 U.S.C. 242d).	B, G, PG, C	Traineeships for graduate or specialized training in public health for physicians, engineers, nurses, and other professional health personnel.	In fiscal year 1967, 1,350 long-term traineeships were awarded; an additional 11,000 persons were supported for short-term training.	$8.0 (1967 appropriation).
Public health training formula grants (sec. 314(c) of Public Health Service Act; 42 U.S.C. 246c).	G, PG, C	Formula grants to accredited schools of public health.	Grants are designed to offset a portion of difference between tuition income and cost of instruction of Federally sponsored students; 13 schools are now aided.	$3.75 (1967 appropriation).

Agency and program	Level of training[1]	Type of aid	Extent of support for health occupations training	Amount of aid (millions)
Public health training project grants (sec. 309 of Public Health Service Act, 42 U.S.C. 242g).	G, PG, C	Grants to strengthen or expand graduate or specialized public health training programs to meet emerging needs.	In fiscal year 1966, 115 grants were awarded to 85 schools of public health, nursing, engineering, medicine, and dentistry. About 145 projects were supported in fiscal year 1967.	$5.0 (1967 appropriation).
Cancer control training:				
Senior clinical traineeships (general cancer control authority and annual appropriation acts) (current appropriation act, P.L. 89-787, 80 Stat 1057).	PG (post residency).	Stipends to students planning a career in service to cancer patients.	In fiscal year 1966, 106 physicians received traineeships.	$1.2 (estimated fiscal year 1966 expenditures).
Individual traineeships (nonphysician) (legal authority same as above).	G	Stipends to students for advanced training in prevention, control, and eradication of cancer.	Program started in fiscal year 1966 with traineeships to 16 persons, to be much expanded in fiscal year 1967.	$0.1 (estimated fiscal year 1966 expenditures).
Cytotechnology training (legal authority same as above).	6 months' laboratory training after 2 years college.	Aid for teaching costs and student stipends.	In fiscal year 1966, grants made to 61 institutions for training of 430-475 cytotechnologists.	$1.4 (estimated fiscal year 1966 expenditures).
Advanced training in medical technology (legal authority same as above).	Post-basic professional	Aid for teaching costs and student stipends.	In fiscal year 1966, grants made to 5 schools of medical technology for training an estimated 350 technologists.	$0.2 (estimated fiscal year 1966 expenditures).
Radiotherapy technology training (legal authority same as above).	Technical	Aid for teaching costs and student stipends.	In fiscal year 1966 grants made to 6 schools for training an estimated 25 students.	$0.15 (estimated fiscal year 1966 expenditures).
Clinical training in community general hospitals (legal authority same as above).	C	Aid for instructional costs.	In fiscal year 1966, grants made to some 30 hospitals.	$0.9 (estimated fiscal year 1966 expenditures).
General clinical training (legal authority same as above).	C	Aid for instructional costs and other educational activities.	In fiscal year 1966, grants made to 22 institutions and agencies.	$0.8 (estimated fiscal year 1966 expenditures).

Agency and program	Level of training [1]	Type of aid	Extent of support for health occupations training	Amount of aid (millions)
Cerebrovascular training—NHI and NINDB:				
Graduate training grants (Public Health Service Act, secs. 412(g) and 433(a); 42 U.S.C. 287a(g), 289c.	G, PG	Aid for teaching costs and student stipends.	For fiscal year 1967, grants approved by NINDB for 5 institutions.	$0.3 (obligated from 1966 funds).
Clinical training grants (legal authority same as above).	C	Aid for teaching costs and student stipends.	For fiscal year 1967, 1 grant approved by NINDB.	$0.03 (obligated from 1966 funds).
Clinical traineeships (legal authority same as above).	G, PG, C	Aid for student stipends.	For fiscal year 1967, traineeships awarded to 2 neurologists.	$0.02 (obligated from 1966 funds).
Clinical cancer training grants—NCI (general cancer control authority and annual appropriation acts) (P.H.S. Act, secs. 402(c) and 433(a); 42 U.S.C. 282, 289c; current appropriation act, P.L. 89-787; 80 Stat. 1057).	BP, G, PG, C.	Project grants for training in cancer prevention, diagnosis, and treatment, and rehabilitation of patients, at undergraduate, graduate, and postgraduate level; aid for teaching costs and student stipends.	Eligible for grants are schools of medicine and principal teaching hospitals, dental schools, schools of public health, and specialized cancer institutions.	$4.97 (fiscal year 1966 funds).
Comprehensive health planning and public health services:				
Planning grants: State formula (Comprehensive Health Planning and Public Health Services Amendments of 1966) (P.L. 89-749, approved Nov. 3, 1966; 42 U.S.C. 246).	Various levels.	Formula aid to States for comprehensive planning in field of health manpower, among other fields; no specific matching required.	Aid for planning of training activities may be included.	$2.5 (1967 appropriation authorization for total program).
Planning grants: Areawide project (legal authority same as above).	Various levels.	Project aid to public or nonprofit areawide planning agencies for metropolitan, regional or local projects; Federal share up to 75 percent of costs.	Same as above	$5.0 (1967 appropriation authorization for total program).
Planning grants: Training, studies, demonstrations (legal authority same as above).	Various levels.	Project aid to public and nonprofit agencies for costs of training, studies, demonstrations.	Aid for training of health planners, among other activities.	$1.5 (1967 appropriation authorization for total program).
Comprehensive public health services grants: Formula block grants (legal authority same as above).	Various levels.	Consolidation of existing formula grants to States for specific diseases and public health problems.	Funds may be used for training, at discretion of States.	$62.5 (1967 appropriation authorization for total program).

Agency and program	Level of training[1]	Type of aid	Extent of support for health occupations training	Amount of aid (millions)
Health service development project grants (legal authority same as above).	Various levels.	Consolidation of existing project grants to public and nonprofit organizations for programs focused on priority health targets.	Funds may be used for training, among other purposes.	$62.5 (1968 appropriation authorization for total program).
Dental auxiliary utilization training (sec. 422(f) of Public Health Service Act, 42 U.S.C. 288a(f)).	BP	Grants to help dental schools establish, expand, or improve programs for teaching undergraduate dental students the effective use of dental auxiliaries, particularly chairside assistants.	46 out of 49 dental schools in the United States are participating in the program.	$2.65 (1967 appropriation).
Heart disease clinical training grants—NHI (general heart disease control authority and annual appropriation acts) (current appropriation act, P.L. 89-787, 80 Stat. 1057).	BP, G, PG, C	Project grants for training physicians in prevention, diagnosis, and treatment of cardiovascular diseases; aid for teaching costs and student stipends.	Grants available to medical schools and principal teaching hospitals, dental schools, and other institutions capable of providing advanced training.	$0.9 (approved and funded in fiscal year 1966).
Mental health training:				
Mental health graduate training (Public Health Service Act, as amended by National Mental Health Act) (P.H.S. Act, sec. 303; 42 U.S.C. 242a).	G, PG	Teaching costs and student stipends.	In fiscal year 1967, there were some 1,100 training grants (excluding research training) which provided stipends for about 7,000 physicians, psychologists, social workers, nurses, and others.	About $60.0, excluding research training (1967 appropriation).
Mental health undergraduate training projects (legal basis same as above).	B, BP	Teaching costs and student stipends.	In fiscal year 1967, there were 294 grants providing stipends for 1,788 medical, nursing, and other undergraduate students.	$8.5 (1967 appropriation).
Mental health continuing education (legal basis same as above).	C	Teaching costs and student stipends.	In fiscal year 1967, there were 121 grants, with stipends to 75 students.	$2.8 (1967 appropriation).
Mental health inservice training (legal basis same as above).	OJT	Aid for instructional costs.	In fiscal year 1967, grants made to 199 mental hospitals and 99 institutions for the mentally retarded for training of aides, attendants, and others involved in direct patient care.	$6.9 (1967 appropriation).
Mental health experimental and special training projects (legal basis same as above).	Various levels.	Teaching costs and student stipends.	In fiscal year 1967, grants totaled 113 and stipends went to 950 students.	$5.8 (1967 appropriation).

gency and program	Level of training [1]	Type of aid	Extent of support for health occupations training	Amount of aid (millions)
Mental retardation training:				
Senior clinical traineeships (annual appropriation acts) (current appropriation act, P.L. 89–787; 80 Stat. 1057).	G, PG, but not residency.	Stipends for students.	In fiscal year 1965, 5 physicians aided.	$0.05 (fiscal year 1965 expenditures).
Individual traineeships (non-physician) (annual appropriation acts).	BP, G, PG	Stipends for students.	In fiscal year 1965, 3 persons aided; program expanded greatly in fiscal year 1966.	$0.01 (fiscal year 1965 expenditures).
Training grants to academic institutions (long term) (annual appropriation acts).	BP, G, PG	Aid for teaching costs and student stipends.	In fiscal year 1966, grants made to 7 institutions.	$0.3 (estimated fiscal year 1966 expenditures).
Planning grants for training (annual appropriation acts).	B, BP, G, PG, C.	Aid for planning (mainly staff salaries).	In fiscal year 1965, grants made to 10 institutions of higher education.	$0.2 (fiscal year 1965 expenditures).
Short-term training grants and contracts (annual appropriation acts).	C	Aid for teaching costs and per diem and travel for students.	In fiscal year 1965, grants made to 6 institutions and agencies; program expanded greatly in fiscal year 1966.	$0.1 (fiscal year 1965 expenditures).
Student work experience and training (annual appropriation acts).	OJT	Pay for students for summer work in health services for mentally retarded.	In fiscal year 1966, grants made to 50 institutions and agencies for jobs for some 700 students.	$0.5 (estimated fiscal year 1966 expenditures).
University-affiliated clinical facility construction (Mental Retardation Facilities and Community Mental Health Centers Construction Act of 1963, title I, pt. B) (P.L. 88–164, approved Oct. 31, 1964; 42 U.S.C. 2661–65).	G, PG, C	Grants for up to 75 percent of construction costs.	Facilities must aid in clinical training of physicians and other specialized personnel.	$7.5 (1965 appropriation).
Neurological and sensory disease control training:				
Senior clinical traineeships (annual appropriation acts) (current appropriation act, P.L. 89–787; 80 Stat. 1057).	G, PG, C, but not residency.	Stipends for students.	In fiscal year 1955, traineeships were granted to 2 physicians.	$0.05 (estimated fiscal year 1966 expenditures).
Individual traineeships (nonphysician) (annual appropriation acts).	BP, G, PG	Stipends for students.	In fiscal year 1965, traineeships were granted to 87 individuals (78 in speech and hearing therapy).	$0.3 (estimated fiscal year 1966 expenditures).

Agency and program	Level of training [1]	Type of aid	Extent of support for health occupations training	Amount of aid (millions)
Long-term training grants (annual appropriation acts).	TI, BP, G, PG.	Teaching costs and student stipends.	In fiscal year 1965, grants were made to 20 universities or hospitals; trainees numbered 82.	$0.9 (estimated fiscal year 1966 expenditures).
Short-term training grants (annual appropriation acts).	C	Teaching costs and student per diem and travel.	In fiscal year 1965, grants were made to 18 universities or hospitals.	Included in amount for long-term training grants above.
Regional medical programs (Heart Disease, Cancer, and Stroke Amendments of 1965) (P.L. 89-239, approved Oct. 6, 1965; 42 U.S.C. 299-299i).	Various levels.	Aid for instructional costs, among others.	Support has been provided for planning of continuing education and other specialized training activities; aid will be provided for operational programs as these are approved.	$32.0 (1967 appropriation for total program).
OFFICE OF EDUCATION Vocational and technical education:				
Grants to States for occupational training (Smith-Hughes Act, George-Barden Act, Vocational Education Act of 1963) (20 U.S.C. 11-28; 20 U.S.C. 15i-g; P.L. 88-210, approved Dec. 18, 1963; 20 U.S.C. 35c(a)).	HS, JC, TI	Up to 50 percent of instructional costs, teacher training, and ancillary services.	In fiscal year 1966, enrollment in preparatory programs in health occupations totaled about 68,300; about 16,700 others received supplementary training.	$6.0 (estimated 1966 expenditures).
Grants to States for area school construction (Vocational Education Act of 1963; additional authorization under Appalachian Regional Development Act of 1965) (P.L. 88-210, approved Dec. 18, 1963; 20 U.S.C. 35l; P.L. 89-4, approved March 9, 1965; 40 app. U.S.C. 211).	HS, JC, TI	Up to 50 percent of construction costs.	Many schools constructed under this program provide training in health occupations.	Not available separately for health occupations training facilities.
Work-study program (Vocational Education Act of 1963) (P.L. 88-210, sec. 13, approved Dec. 18, 1963; 20 U.S.C. 35k).	HS, JC, TI	Part-time employment for students; Federal share not to exceed 75 percent of costs, starting fiscal year 1967.	Aid available to students in all occupational fields including health.	$25.0 (1966 appropriation for total program).
Research and demonstration grants (Vocational Education Act of 1963) (P.L. 88-210, sec. 4(c), approved Dec. 18, 1963; 20 U.S.C. 35c(c)).	HS, JC, TI	Part of operating cost of research and demonstration projects. No specific matching.	Grants have been made for research and demonstrations on health occupations training.	$17.7 (1966 appropriation for total program).

Agency and program	Level of training[1]	Type of aid	Extent of support for health occupations training	Amount of aid (millions)
MDTA institutional training (Manpower Development and Training Act of 1962, as amended, title II) (P.L. 87-415, approved Mar. 15, 1962; 42 U.S.C. 2581-2602).	HS, JC, TI	Instructional costs (Federal share not to exceed 90 percent of costs, starting fiscal year 1967) and allowances to trainees.[2]	From inception of program in September 1962 through December 1966, about 53,000 trainees were approved for training in health occupations; an additional 8,000 were approved in 1st 4 months of 1967.	About $67.0 for health occupations training projects approved from September 1962 through December 1966.
ARA institutional training (Area Redevelopment Act of 1961, as amended, merged with title II of MDTA by Manpower Act of 1965) (P.L. 87-27, approved May 1, 1961; 42 U.S.C. 2513).	HS, JC, TI	Instructional costs (no matching) and allowances to trainees.[2]	Among those trained have been nursing aides, orderlies, and other health personnel.	Included with MDTA training above.
Vocational student loan insurance (National Vocational Student Loan Insurance Act of 1965) (P.L. 89-287, approved Oct. 22, 1965; 20 U.S.C. 981-996).	HS, JC, TI	Aid for low-cost loans for students.	Students in health occupations are eligible for loans.	$1.0 (1966 appropriation for total program).
Higher education programs:				
Higher education facilities construction—public community colleges and technical institutes (Higher Education Facilities Act of 1963, title I) (P.L. 88-204, approved Dec. 16, 1963; 20 U.S.C. 713).	JC, TI	Up to 40 percent of construction costs.	Some aid has been provided for construction of facilities for health occupations training at this level.	$100.8 (1966 appropriation for total program).
Higher education facilities construction—other undergraduate facilities (Higher Education Facilities Act of 1963, title I) (P.L. 88-204, approved Dec. 16, 1963; 20 U.S.C. 714).	JC, TI, B	Up to 33⅓ percent of construction costs.	Institutions providing training for health personnel theoretically eligible for aid, unless covered by special legislation.	$357.0 (1966 appropriation for total program).
Higher education facilities construction—graduate facilities (Higher Education Facilities Act of 1963, title II) (P.L. 88-204, approved Dec. 16, 1963; 20 U.S.C. 731-733).	G	Up to 33⅓ percent of construction costs.	Institutions providing training for professional health personnel theoretically eligible, unless covered by special legislation.	$60.0 (1966 appropriation for total program).

Agency and program	Level of training [1]	Type of aid	Extent of support for health occupations training	Amount of aid (millions)
Higher education facilities construction—construction loans (Higher Education Facilities Act of 1963, title III) (P.L. 88-204, approved Dec. 16, 1963; 20 U.S.C. 741-745).	JC, TI, B, G	Loans for construction of academic facilities.	Institutions providing training for health personnel theoretically eligible for aid.	$110.0 (1966 appropriation for total program).
Project grants for developing institutions (Higher Education Act of 1965, title III) (P.L. 89-329, approved Nov. 8, 1965, 20 U.S.C. 1051-1055).	JC, TI, B	Grants to pay part of costs of projects to strengthen academic programs and administration.	Institutions providing training for health personnel theoretically eligible for aid.	$5.0 (1966 appropriation for total program).
National defense student loans (National Defense Education Act, as amended) (P.L. 85-864, approved Sept. 2, 1958; 20 U.S.C. 421-429).	JC, TI, B, BP, G.	Support for low-cost, long-term loans to students.	Health professions students not covered by Health Professions or Nursing Student Loan Program may receive aid.	$181.0 (1966 appropriation for total program).
Guaranteed loans (Higher Education Act of 1965, title IV, pt. B) (P.L. 89-329, approved Nov. 8, 1965; 20 U.S.C. 1071-1085).	JC, TI, B, BP, G.	Insurance for loans to students.	Health professions students eligible for aid, if not covered by special legislation.	$10.0 (1966 appropriation for total program).
Educational opportunity grants (Higher Education Act of 1965, title IV, pt. A) (P.L. 89-329, approved Nov. 8, 1965; 20 U.S.C. 1061-1069).	JC, TI, B	Support for scholarships to needy students.	Program going into operation in 1966-67; health occupations students at this level eligible for aid.	$58.0 (1966 appropriation for total program).
College work-study program (Economic Opportunity Act of 1964, pts. C and D, as amended) (P.L. 88-452, approved Aug. 20, 1964; 42 U.S.C. 2751-2761).	JC, TI, B, BP, G.	Part-time employment for students. Federal share may not exceed 90 percent of costs.	Health occupations students eligible to participate.	$99.1 (1966 appropriation for total program).
Training of teachers of handicapped (P.L. 85-926, approved Sept. 6, 1958, P.L. 88-164, approved Oct. 31, 1963; 20 U.S.C. 611-617).	B (senior year), G.	Aid for teaching costs and student stipends.	In fiscal year 1965, 99 institutions received training grants for speech and hearing therapy; and stipends were awarded to 608 individuals in this field.	$1.7 (fiscal year 1965 expenditures for speech and hearing therapy training).
Community service and continuing education program (Higher Education Act of 1965, title I). (P.L. 89-329, approved Nov. 8, 1965; 20 U.S.C. 1001-1011).	OJT, HS, C	Aid for costs of service programs, including university extension and continuing education (75 percent of costs in fiscal years 1966 and 1967, 50 percent in fiscal year 1968).	Grants have helped train health technicians, provide refresher courses for professional health personnel, etc.	$10.0 (1966 appropriation for total program).

Agency and program	Level of training [1]	Type of aid	Extent of support for health occupations training	Amount of aid (millions)
VOCATIONAL REHABILITATION ADMINISTRATION [3]				
Long-term training grants (secs. 4(a) and 7(a), Vocational Rehabilitation Act as amended, P.L. 89-333, approved Nov. 8, 1965; 29 U.S.C. 34(a) and 37(a)).	HS, JC, TI, B, BP, G, PG, C.	Aid for instructional costs and student stipends (institution must pay "part" of costs).	In fiscal year 1966, there were 515 grants, with 4,509 individuals receiving traineeships for training in fields involved in rehabilitation.	$21.3 (estimated fiscal year 1966 expenditures).
Short-term training grants (sec. 7(a)(2), Vocational Rehabilitation Act as amended, P.L. 89-333, approved Nov. 8, 1965; 29 U.S.C. 37(a)(2)).	OJT, G, PG, C.	Aid for instructional costs and student expenses (institution or agency must pay "part" of costs).	In fiscal year 1966, there were 175 training grants for the training of 9,300 persons in rehabilitation fields.	$2.4 (estimated fiscal year 1966 expenditures).
State inservice training (sec. 4(a)(1), Vocational Rehabilitation Act, as amended, P.L. 89-333, approved Nov. 8, 1965; 29 U.S.C. 34(a)(1)).	OJT, HS, TI, C.	Aid to State rehabilitation agencies for inservice training of staff; Federal share may not exceed 90 percent of costs.	Grants made to 77 State agencies in fiscal year 1965.	$0.4 (estimated fiscal year 1966 expenditures).
Research and demonstration grants (sec. 4(a)(1), Vocational Rehabilitation Act, as amended, P.L. 89-333, approved Nov. 8, 1965; 29 U.S.C. 34(a)(1)).	Various levels.	Partial support of projects promising substantial contributions to solution of rehabilitation problems.	Some projects have related to training of rehabilitation personnel.	$17.0 (estimated fiscal year 1965 expenditures for total program).
Grants for rehabilitation research and training centers (sec. 4(a)(1), Vocational Rehabilitation Act, as amended, P.L. 89-333, approved Nov. 8, 1965; 29 U.S.C. 34(a)(1)).	Various levels.	Payment of part of costs of instruction, alterations and renovations, some student aid.	Some 17 centers have been established since program began in 1962.	$7.6 (1966 appropriations for total program).
WELFARE ADMINISTRATION [3]				
Work experience program (title V of the Economic Opportunity Act, as amended, P.L. 88-452 (1964); 42 U.S.C. 2922 et seq.).	OJT, vocational.	Aid for costs of projects to provide work-experience for unemployed parents and other needy persons.	As of 1966 an estimated 5,000 persons a year are being trained for health service occupations such as practical nurses, nursing aides, orderlies, etc.	$123.9 (1966 appropriations for total program, to train about 85,000 persons).
Medical assistance personnel training (sec. 1903(a)(2), Social Security Act, as amended, P.L. 89-97, approved July 30, 1965; 42 U.S.C. 1396b(a)(2)).	OJT, G, C....	Aid for 75 percent of costs of teaching and student support, for State medical assistance program personnel.	Program went into effect on Jan. 1, 1966.	No reports as yet.

Agency and program	Level of training [1]	Type of aid	Extent of support for health occupations training	Amount of aid (millions)
Maternal and child health and crippled children's services training project grants (secs. 502(b), 512(b), and 516, Social Security Act, as amended, P.L. 86-778, approved Sept. 13, 1960, and P.L. 89-97, approved July 30, 1965; 42 U.S.C. 702(b), 712(b), and 716).	B, G, PG, C (generally post-basic professional).	Payment for instructional costs and student stipends.	In fiscal year 1965, training grants awarded to some 50 institutions and fellowships awarded to some 240 physicians, nurses, audiologists and speech pathologists, and medical social workers.	$10.6 (estimated fiscal year 1966 expenditures).
DEPARTMENT OF LABOR				
Manpower development and training—institutional training (secs. 203 and 231, Manpower Development and Training Act of 1962, as amended, P.L. 89-15, approved April 26, 1965, 42 U.S.C. 2583 and 2586).	HS, JC, TI	Aid for instructional costs, trainee allowances.[4]	See Office of Education	$160.5 (fiscal year 1966 expenditures for training allowances for total program; expenditures for instructional costs appear under Office of Education above).
Manpower development and training—on-the-job training (sec. 204 Manpower Development and Training Act, as amended, P.L. 87-415, approved Mar. 15, 1962, 42 U.S.C. 2584).	OJT	Aid for instructional costs of on-the-job training of workers for unfilled jobs.	Since 1962 more than 200 contracts have been made with hospitals, nursing homes, and other institutions for training in more than 50 health-care occupations; as of June 1966, programs involving almost 3,000 trainees underway under contract with American Hospital Association's Research and Educational Trust alone.	$54.2 (fiscal year 1966 expenditures for total program).
ARA on-the-job training (sec. 241, Manpower Development and Training Act of 1962, as amended, P.L. 89-15, approved Apr. 26, 1965; 42 U.S.C. 2610a).	OJT	Same as above	Training has been provided in health occupations.	$0.7 (fiscal year 1966 expenditures for total program).
Manpower development and training—experimental and demonstration projects (sec. 105, Manpower Development and Training Act of 1962, as amended, P.L. 89-15, approved Apr. 26, 1965; 42 U.S.C. 2572).	OJT, HS, JC, TI.	Aid for instructional and other project costs, with no matching required.	Some projects have involved training of health personnel.	$19.2 (fiscal year 1966 expenditures for total program).

Agency and program	Level of training[1]	Type of aid	Extent of support for health occupations training	Amount of aid (millions)
Neighborhood Youth Corps (title I, pt. B, Economic Opportunity Act of 1964, as amended, P.L. 88-452, approved Aug. 20, 1964, P.L. 89-253, approved Oct. 9, 1965, and P.L. 89-794, approved Nov. 8, 1966; 42 U.S.C. 2731-2736).	OJT	Payment of up to 90 percent of costs of providing part-time work and work experience for actual or potential school drop outs age 16-21.	Among the groups trained have been nursing aides, hospital orderlies, and other types of health personnel.	$254.0 (estimated fiscal year 1966 expenditures for total work training program).
DEPARTMENT OF COMMERCE				
Area redevelopment manpower training (Area Redevelopment Act of 1961, as amended; now merged with title II of Manpower Development and Training Act)[5] (P.L. 87-27, approved May 1, 1961; 42 U.S.C. 2501-25).	OJT, HS, JC, TI.	Aid for instructional costs and, in case of institutional training, training allowances.	In the period November 1961 to June 1965 about 6,500 persons were approved for training in health occupations, including nursing aides, psychiatric aides, and others.	$22.0 (fiscal year 1966 expenditures for total program; including $7.9 million for institutional training costs, $13.4 million for training allowances, and $0.7 million for on-the-job training).
DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT				
College housing program (Housing Act of 1950) (12 U.S.C. 1749-1749c).	JC, TI, B, BP, G, PG.	Long-term loans for construction of housing and other service facilities.	Loans have been made specifically for housing for hospital nursing schools and for interns and residents, as well as for college housing generally.	In fiscal year 1966, loans for housing of nursing students and interns and residents totaled $3.0 million.
OFFICE OF ECONOMIC OPPORTUNITY				
Community action program (title II, pt. A, Economic Opportunity Act of 1964, as amended, P.L. 88-452, approved Aug. 20, 1964, P.L. 89-253, approved Oct. 9, 1965, P.L. 89-794, approved Nov. 8, 1966; 42 U.S.C. 2782-2794).	Various levels.	Assistance for community action programs mobilizing resources against poverty, which may include training of personnel.	An example of aid for training in health occupations is the Home Health Aide pilot training project, which trained and placed 3,000 persons by the end of fiscal year 1966.	$2.7 for home health project alone in fiscal year 1966.

Agency and program	Level of training [1]	Type of aid	Extent of support for health occupations training	Amount of aid (millions)
VISTA (title VIII, Economic Opportunity Act of 1964 , as amended, P.L. 89-794, approved Nov. 8, 1966; 42 U.S.C. 2991a-2991e).	Intensive 6-week course prior to working.	Payment of costs of training and employing volunteers.	Volunteers have worked in hospitals and health programs, and programs for the mentally ill or retarded.	$15.9 (fiscal year 1966 obligations for total program.)
Job Corps (title I, pt. A, Economic Opportunity Act of 1964, as amended, P.L. 88-542, approved Aug. 20, 1964, P.L. 89-253, approved Oct. 9, 1965, P.L. 89-794, approved Nov. 8, 1966; 42 U.S.C. 2711-2722).	OJT, vocational.	Support of residential training centers for youth from impoverished homes, including construction and operation.	Training in health service occupations is provided at some centers.	$303.5 (fiscal year 1966 obligations for total program).
VETERANS' ADMINISTRATION				
GI Bill educational benefits sec. 2, Veterans Readjustment Benefits Act of 1966, P.L. 89-358, approved March 3, 1966; 38 U.S.C. 1651-1686).	Various levels.	Aid to students ($100-$150 a month, depending on number of dependents).	Veterans preparing for health occupations are eligible for aid.	Program just going into effect.

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[1] Key to level of training: OJT—on-the-job training, HS—high school, JC—junior college, TI—technical institute, B—baccalaureate, BP—basic professional, G—graduate or specialized, PG—post-graduate, C—continuing.

[2] Allowances to trainees for up to 104 weeks of training, administered through the Department of Labor.

[3] The Social Rehabilitation Service was established on August 15, 1967, to carry out the functions of the Welfare Administration, the Vocational Rehabilitation Administration, the Administration on Aging, and the Mental Retardation Division of the Bureau of Health Services of the Public Health Service.

[4] Aid for instructional costs under institutional training programs administered through Office of Education.

[5] Program administered in cooperation with Office of Education and Department of Labor.

NOTE.—Excludes: Research training support, environmental health training programs, medical library training, training programs for limited groups (e.g., Indians, children of deceased veterans, etc.), and direct Federal training programs.

APPENDIX I

STATISTICAL CALCULATIONS FOR CHAPTER VIII[1]

The statistical calculations in this appendix are based on the following information:

Year	Number of Conditions per 100 Population			
	Acute Conditions		Chronic Conditions	
	Total	Seen by a Physician	Total	Seen by a Physician
1958-1959	214.8	133.6	74.4	64.2
1959-1960	203.4	130.7	77.1	67.0
1960-1961	201.9	126.8	82.5	71.5
1961-1962	222.3	140.0	86.7	75.0
1962-1963	218.8	146.9	89.9	78.1
1963-1964	208.5	134.7	93.0	81.1

Source: NCHS, Physician Visits, Series 10, No. 18 (Washington: U.S. Government Printing Office, June, 1965), p. 3.

The curvilinear regression equation was utilized to determine the relationship between time (expressed in years) and acute medical conditions not seen by a physician (unmet acute medical need). The equation is as follows:

$$y = b_1 x_1^2 + b_2 x_1 + a$$

Solving the equation for the variables time (expressed in years) and unmet acute medical need for the years 1958-1959 to 1963-1964, the following values for a, b_2, and b_1 were obtained:

$$\begin{aligned} a &= +185.75 \\ b_2 &= -\ 69.312 \\ b_1 &= +\ \ 9.081 \end{aligned}$$

---

[1] For more discussion of methodology, see George A. Ferguson, Statistical Analysis in Psychology and Education (New York: McGraw-Hill Book Company, 1966), pp. 117-130, 342-351.

When the y values (unmet acute medical need) were distributed according to a parabolic curve, the lowest point on the curve was 54.4 acute conditions per 100 population not seen by a physician. Based on the available information, this represents the lowest level of unmet acute medical need that can reasonably be expected to be achieved according to statistical analysis. The number of acute medical conditions were projected for the years 1975 and 1985 by applying the 1965 rates of acute conditions (see Chapter IV) to the estimated population for 1975 and 1985. The estimated number of acute conditions for 1965, 1975, and 1985 were as follows:

	1965	1975	1985
All Ages	333,028	441,315	584,852
-6	89,906	150,046	238,658
6-16	89,074	125,542	169,072
17-44	100,801	97,638	92,685
45+	53,247	68,089	84,437

If the unmet medical need for acute conditions was reduced from 73.8 in 1964 to 54.4 in 1985 by a constant amount each year, the following amounts of unmet acute medical need would exist in 1965, 1975 and 1985:

	1965	1975	1985
Acute conditions not seen by a physician	109,881	121,797	131,085

The number of acute conditions seen by a physician for these years would be as follows:

	1965	1975	1985
Acute conditions seen by a physician	223,147	319,518	453,767

A linear regression equation was utilized to determine the relationship between time (expressed in years) and unmet chronic medical need. The equation is as follows:

$$y = bx + a$$

By solving the equation for the above variables for the years 1958-1959 to 1963-1964, the following values were determined for b and a: $b = .41$ and $a = 9.7$. The number of chronic conditions per 100 population not seen by a physician was determined by substituting the number of years from 1959 to the year of the projection for x in the equation $y = bx + a$. For the years 1965, 1975 and 1985 the following y values were determined:

1965 $y = (.41)(6) + 9.7 = 12.2$ chronic conditions per 100 population not seen by a physician

1975 $y = (.41)(16) + 9.7 = 16.3$ chronic conditions per 100 population not seen by a physician

1985 $y = (.41)(26) + 9.7 = 20.4$ chronic conditions per 100 population not seen by a physician

The number of persons having one or more chronic conditions were projected for the years 1975 and 1985 by applying the national prevalence rate reported in Chapter IV to the projected population in the Green Bay area for 1975 and 1985. This figure multiplied by 1.9, the average number of conditions per person affected by a chronic disease, provides an estimate of the number of chronic conditions in 1965, 1975 and 1985. The estimated number of chronic conditions are as follows: 1965, 135,068 chronic conditions; 1975, 163,996 chronic conditions; 1985, 198,254 chronic conditions.

The number of chronic conditions for these years not seen by a physician can be determined by multiplying the number of chronic conditions per 100 population by the estimated population for 1965, 1975 and 1985. By simple subtraction, the estimated number of chronic conditions that will be seen by a physician during these years can be determined. The estimated chronic conditions seen by a physician in 1965 and that will be seen in 1975 and 1985 are as follows:

	1965	1975	1985
Chronic conditions with physician visit	116,674	132,809	148,726
Chronic conditions without physician visit	18,394	31,187	49,528

The total number of acute and chronic conditions predicted to be seen by a physician and the total amount of unmet acute and chronic medical need for the years 1965, 1975, and 1985 is estimated to be as follows:

	1965	1975	1985
Acute and chronic conditions seen/or expected to be seen by a physician	339,821	452,327	602,493
Acute and chronic conditions not seen/or expected to be seen by a physician	128,275	152,984	180,613

The projected requirements for physicians in the Green Bay area in 1975 and 1985 are presented below. The projections are determined by keeping the number of medical conditions seen per physician constant while projecting the number of medical conditions that will be seen by a physician in these years.

Projected requirements for physicians in 1975 and 1985, Green Bay service area:

$$\frac{\text{Acute \& chronic conditions expected to be seen by a physician, 1975}}{\text{Conditions seen per physician, 1965}^{a}} = \frac{452,327}{2,614} = 173 \text{ physicians, 1975}$$

$$\frac{\text{Acute \& chronic conditions expected to be seen by a physician, 1985}}{\text{Conditions seen per physician, 1965}^{a}} = \frac{602,493}{2,614} = 230 \text{ physicians, 1985}$$

$$^{a}\frac{\text{Estimated acute \& chronic conditions seen by a physician, 1965}}{\text{Number of physicians, Brown County, 1965}^{2}} = 2,614$$

A linear regression equation was employed to determine the relationship between acute medical conditions seen by a physician and hospital admissions. The equation employed is as follows:

$$y = bx_1 + a$$

---

[2] Wisconsin State Board of Health, State Plan for Hospital and Medical Facilities, 1966-1967.

The number of acute conditions seen by a physician and the number of hospital admissions for the years 1959 to 1964 were as follows:

Acute Conditions Seen by a Physician	Year	Number of Hospital Admissions
266,611	1959	26,615
271,745	1960	26,606
277,854	1961	27,941
306,962	1962	28,861
325,927	1963	30,246
319,607	1964	30,603

The values for b and a were determined to be as follows:

$$b = .028 \text{ and } a = 20{,}104$$

Having previously determined the number of acute conditions expected to be seen by a physician, for 1975 and 1985, the number of hospital admissions was determined by substituting this figure for x_i in the equation $y = bx_i + a$. The resulting value for y = the number of admissions.

$$y = (.028)\ (456{,}786) + 20{,}104$$

$$y = 32{,}894 \text{ hospital admissions in 1975}$$

$$y = (.028)\ (611{,}557) + 20{,}104$$

$$y = 37{,}327 \text{ hospital admissions in 1985}$$

The projected requirements for professional, registered nurses in 1975 and 1985 are presented below. These projections are arrived at by maintaining a constant ratio between hospital admissions and professional nurses and hospital employees.

Projected requirements for professional, registered nurses and hospital employees in 1975 and 1985, Green Bay service area:

PROFESSIONAL REGISTERED NURSES

$$\frac{\text{Hospital admissions, 1975}}{\text{Admissions}^{3}\text{/registered nurse,}^{4}\text{ 1965}} = \frac{32{,}894}{64.4} = 511 \text{ RN's, } 1975$$

$$\frac{\text{Hospital admissions, 1985}}{\text{Admissions/registered nurse, 1965}} = \frac{37{,}327}{64.4} = 580 \text{ RN's, } 1985$$

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[3] *Hospitals, JAHA, Guide Issue,* Part II (August 1, 1966).

[4] The State of Wisconsin, Department of Health and Social Service, Research Division.

REGISTERED NURSES EMPLOYED BY HOSPITALS

$$\frac{\text{Hospital admissions, 1975}}{\text{Admissions/registered nurse employed by hospitals, 1965[5]}} = \frac{32{,}894}{84.6} = \text{389 RN's employed by hospitals, 1975}$$

$$\frac{\text{Hospital admissions, 1985}}{\text{Admissions/registered nurse employed by hospitals, 1965}} = \frac{37{,}327}{84.6} = \text{441 RN's employed by hospitals, 1985}$$

ALL HOSPITAL EMPLOYEES

$$\frac{\text{Hospital admissions, 1975}}{\text{Admissions/hospital employee 1965[6]}} = \frac{32{,}894}{25.5} = \text{1,290 hospital employees, 1975}$$

$$\frac{\text{Hospital admissions, 1985}}{\text{Admissions/hospital employee, 1965}} = \frac{37{,}327}{25.5} = \text{1,464 hospital employees, 1985}$$

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[5] *Ibid.*

[6] *Hospitals, JAHA*, Guide Issue, *loc. cit.*

APPENDIX J

TABLE OF RELATIVE STUDY OF ALLIED HEALTH PERSONNEL IN SELECTED SUBJECTS

This table, taken from an article by Thomas P. Weil and Henry M. Parrish in the July, 1967 issue of the *Journal of Medical Education*, is not to be taken to be the basis of an integrated curriculum, but rather as an indication of the possibilities of combining programs in various professions into an integrated program in order to take advantage of greater opportunities for enrichment of the course offering. As is indicated in the table, the allied health personnel do not undertake the study of all subjects in equal depth, yet all of the relevant subjects must be provided in sufficient depth for the purposes of the particular program. For example, in the table it is shown that an inhalation therapist is required to take twelve hours of bacteriology as opposed to eighty hours for the physical therapist, but in any event, it would be more economical to provide the faculty to teach the 188 hours indicated in the entire row, for all subject areas this will also provide a concomitant increase in the quality of the instruction.

The table is not definitive, but merely indicative of, the possibilities of a coordinated curriculum taught within the facilities of the proposed health camplex.

TABLE 1

Number of Clock Hours Per Subject Based on Accreditation Standards of 11 Allied Health Training Programs*

Subject	DH[a]	DA[b]	IT	MR[c]	MT	AN	OT	P[d]	PT	PN[e]	RT[f]
Basic and Biological Sciences											
Anatomy	64	......	12	80	......	......	80	48	210	64	32
Bacteriology	......	48	12	......	48	......	......	80	......	......	......
Chemistry	64	128	6	80	256	......	......	272	......	80	......
Microbiology	80	......	......	......	......	......	......	......	......	48	......
Pathology	48	......	12	......	......	......	......	48	30	......	......
Pharmacology	32	......	......	......	......	......	......	128	......	48	......
Physics	......	......	10	......	48	......	......	112	......	......	64
Physiology	48	48	12	80	......	......	64	64	150	80	32
General Requirement	......	......	......	80	206	......	......	......	......	......	......
Management Sciences											
Department Management and Administration	......	256	15	192	......	......	......	96	30	......	......
Social and Other Sciences											
Economics	......	......	......	......	......	......	......	48	......	......	......
Psychology	96	96	6	96	......	......	80	......	15	48	48
Mathematics	......	......	......	80	48	......	......	80	......	......	48
Nutrition	32	64	......	......	......	......	......	......	......	48	......
Public Health	144	......	......	......	......	......	......	48	......	48	......
Sociology	48	......	......	48	......	......	64	......	......	96	......
Clinical Training											
Lectures and Seminars	176	64	135	192	104	250	432	512	480	528	1.398
Experience	272	224	980	500	2,000	500	1.040	528	600	1,878	2,000
Number of Years of Training	2	4	0.75	4	4	1.5	4	4	4	4	3

*Programs include: Dental Hygiene (DH), Dietetics-Administration (DA), Inhalation Therapy (IT), Medical Records (MR), Medical Technology (MT), Anesthesiology for Nurses (AN), Occupational Therapy (OT), Pharmacy (P), Physical Therapy (PT), Professional Nursing (PN), and Radiologic Technology (RT).

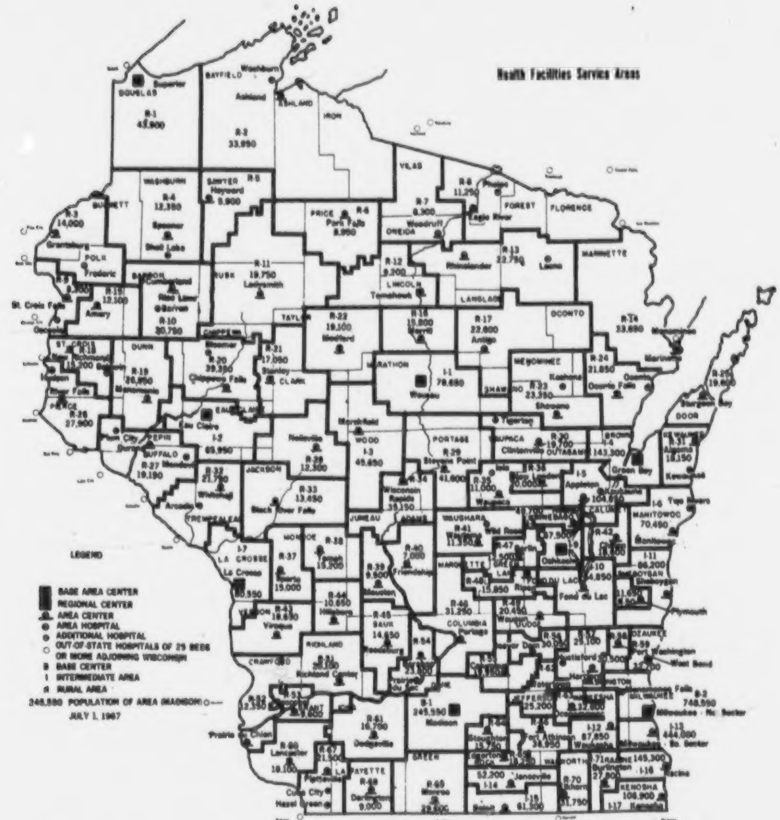
[b] This is based on the requirements for admission to an internship with "an emphasis on food service management and a concentration in therapeutic and administrative dietetics." This does not include the didactic and clinical work of an American Dietetic Association internship.

[c] The standards are relatively broad and the clock hours are based on the Indiana University medical records administration program.

[d] The standards are relatively broad and the clock hours are based on the University of Missouri at Kansas City program

[e] The standards are relatively broad and the clock hours are based on the University of Missouri at Columbia program.

[f] The clock hours are based on the program of a three-year hospital school of radiologic technology affiliated with a junior college awarding the associate in science degree.


Health Facilities Service Areas
LEGEND
BASE AREA CENTER
REGIONAL CENTER
AREA CENTER
AREA HOSPITAL
ADDITIONAL HOSPITAL
OUT-OF-STATE HOSPITALS OF 25 BEDS OR MORE ADJOINING WISCONSIN
B BASE CENTER
I INTERMEDIATE AREA
R RURAL AREA
246,580 POPULATION OF AREA (MADISON)
JULY 1, 1967
DOUGLAS
Superior
R-1
43,800
BAYFIELD
Washburn
Ashland
ASHLAND
R-2
33,950
IRON
VILAS
WASHBURN
SAWYER
Hayward
BURNETT
POLK
BARRON
RUSK
PRICE
Park Falls
ONEIDA
Woodruff
Rhinelander
FOREST
FLORENCE
MARINETTE
LINCOLN
Tomahawk
LANGLADE
Antigo
OCONTO
TAYLOR
Medford
Ladysmith
CHIPPEWA
Chippewa Falls
CLARK
MARATHON
I-1
Wausau
MENOMINEE
SHAWANO
Shawano
DOOR
Sturgeon Bay
Eau Claire
I-2
DUNN
PIERCE
PEPIN
BUFFALO
R-27
19,190
JACKSON
Black River Falls
WOOD
I-3
PORTAGE
Stevens Point
WAUPACA
Clintonville
OUTAGAMIE
Appleton
BROWN
Green Bay
KEWAUNEE
MANITOWOC
TREMPEALEAU
Arcadia
I-7
LA CROSSE
La Crosse
MONROE
JUNEAU
ADAMS
Wisconsin Rapids
WAUSHARA
Wild Rose
WINNEBAGO
Oshkosh
FOND DU LAC
Fond du Lac
SHEBOYGAN
Sheboygan
Plymouth
MARQUETTE
GREEN LAKE
VERNON
Viroqua
RICHLAND
Richland Center
SAUK
COLUMBIA
Portage
DODGE
WASHINGTON
West Bend
OZAUKEE
CRAWFORD
Prairie du Chien
B-1
245,550
Madison
JEFFERSON
WAUKESHA
Waukesha
MILWAUKEE
Milwaukee
Dodgeville
GRANT
Lancaster
LAFAYETTE
Darlington
Cuba City
Hazel Green
GREEN
Monroe
ROCK
Janesville
Beloit
WALWORTH
RACINE
Racine
KENOSHA
Kenosha

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